Appendix A

```
****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7670
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =   11.430
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.700
  SUBAREA RUNOFF(CFS) =    116.90
  TOTAL AREA(ACRES) =     89.64   TOTAL RUNOFF(CFS) =    116.90

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.86  DOWNSTREAM(FEET) =   437.26
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  25.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.77
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    116.90
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  11.54
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    400.00 =  1600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.690
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6626
  SUBAREA AREA(ACRES) =   44.00   SUBAREA RUNOFF(CFS) =   33.45
  TOTAL AREA(ACRES) =    133.64   TOTAL RUNOFF(CFS) =  149.62
  TC(MIN.) =  11.54

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    410.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    437.26  DOWNSTREAM(FEET) =    367.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0468
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0468 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    149.62
  FLOW VELOCITY(FEET/SEC) =   6.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.89   Tc(MIN.) =  15.44
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  3100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.401
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6047
  SUBAREA AREA(ACRES) =    50.00   SUBAREA RUNOFF(CFS) =31.51
  TOTAL AREA(ACRES) =    183.64   TOTAL RUNOFF(CFS) =  155.55
  TC(MIN.) =  15.44

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  15.44
  RAINFALL INTENSITY(INCH/HR) =1.40
  TOTAL STREAM AREA(ACRES) =   183.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    155.55

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       47.77    18.07        1.265         83.90
      2       70.82    30.56        0.902        127.10
      3      155.55    15.44        1.401        183.64

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      232.12    15.44       1.401
      2      230.16    18.07       1.265
      3      204.99    30.56       0.902

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    232.12   Tc(MIN.) =   15.44
  TOTAL AREA(ACRES) =    394.64
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    500.00 =  5243.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =    394.64  TC(MIN.) =     15.44
  PEAK FLOW RATE(CFS)   =    232.12
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Total Existing 2-Year, 6-hour flow to Wolf Canyon = 155.6 CFS
Tc = 15.4 min
Total Area = 183.6 acres

```
****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7670
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =   11.430
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.628
  SUBAREA RUNOFF(CFS) =    180.67
  TOTAL AREA(ACRES) =     89.64   TOTAL RUNOFF(CFS) =    180.67

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.86  DOWNSTREAM(FEET) =   437.26
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  32.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.49
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    180.67
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  11.53
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    400.00 =  1600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.613
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6626
  SUBAREA AREA(ACRES) =   44.00   SUBAREA RUNOFF(CFS) =   51.73
  TOTAL AREA(ACRES) =    133.64   TOTAL RUNOFF(CFS) =  231.38
  TC(MIN.) =  11.53

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    410.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    437.26  DOWNSTREAM(FEET) =    367.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0468
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0468 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    231.38
  FLOW VELOCITY(FEET/SEC) =   7.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.37   Tc(MIN.) =  14.90
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  3100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.215
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6047
  SUBAREA AREA(ACRES) =    50.00   SUBAREA RUNOFF(CFS) =49.83
  TOTAL AREA(ACRES) =    183.64   TOTAL RUNOFF(CFS) =  245.96
  TC(MIN.) =  14.90

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.90
  RAINFALL INTENSITY(INCH/HR) =2.21
  TOTAL STREAM AREA(ACRES) =   183.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    245.96

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       78.71    16.36        2.085         83.90
      2      112.47    28.60        1.454        127.10
      3      245.96    14.90        2.215        183.64

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      376.22    14.90       2.215
      2      374.59    16.36       2.085
      3      328.89    28.60       1.454

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    376.22   Tc(MIN.) =   14.90
  TOTAL AREA(ACRES) =    394.64
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    500.00 =  5243.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =    394.64  TC(MIN.) =     14.90
  PEAK FLOW RATE(CFS)   =    376.22
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Total Existing 10-Year, 6-hour flow to Wolf Canyon = 246.0 CFS
Tc = 14.9 min
Total Area = 183.6 acres

```
****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7670
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =   11.430
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.782
  SUBAREA RUNOFF(CFS) =    191.29
  TOTAL AREA(ACRES) =     89.64   TOTAL RUNOFF(CFS) =    191.29

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.86  DOWNSTREAM(FEET) =   437.26
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  33.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.71
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    191.29
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  11.53
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    400.00 =  1600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.767
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6626
  SUBAREA AREA(ACRES) =   44.00   SUBAREA RUNOFF(CFS) =   54.78
  TOTAL AREA(ACRES) =    133.64   TOTAL RUNOFF(CFS) =  245.01
  TC(MIN.) =  11.53

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    410.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    437.26  DOWNSTREAM(FEET) =    367.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0468
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0468 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    245.01
  FLOW VELOCITY(FEET/SEC) =   7.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.30   Tc(MIN.) =  14.83
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  3100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.352
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6047
  SUBAREA AREA(ACRES) =    50.00   SUBAREA RUNOFF(CFS) =52.91
  TOTAL AREA(ACRES) =    183.64   TOTAL RUNOFF(CFS) =  261.16
  TC(MIN.) =  14.83

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.83
  RAINFALL INTENSITY(INCH/HR) =2.35
  TOTAL STREAM AREA(ACRES) =   183.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    261.16

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       84.03    16.16        2.226         83.90
      2      119.48    28.36        1.548        127.10
      3      261.16    14.83        2.352        183.64

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      400.82    14.83       2.352
      2      399.27    16.16       2.226
      3      349.86    28.36       1.548

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    400.82   Tc(MIN.) =   14.83
  TOTAL AREA(ACRES) =    394.64
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    500.00 =  5243.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =    394.64  TC(MIN.) =     14.83
  PEAK FLOW RATE(CFS)   =    400.82
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Total Existing 25-Year, 6-hour flow to Wolf Canyon = 261.2 CFS
Tc = 14.8 min
Total Area = 183.6 acres

```
****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7670
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =   11.430
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.401
  SUBAREA RUNOFF(CFS) =    233.80
  TOTAL AREA(ACRES) =     89.64   TOTAL RUNOFF(CFS) =    233.80

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.86  DOWNSTREAM(FEET) =   437.26
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  38.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =17.46
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    233.80
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  11.53
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    400.00 =   100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.382
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6626
  SUBAREA AREA(ACRES) =   44.00   SUBAREA RUNOFF(CFS) =   66.97
  TOTAL AREA(ACRES) =    133.64   TOTAL RUNOFF(CFS) =  299.53
  TC(MIN.) =  11.53

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    410.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    437.26  DOWNSTREAM(FEET) =    367.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0468
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0468 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    299.53
  FLOW VELOCITY(FEET/SEC) =   8.09 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.09   Tc(MIN.) =  14.62
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  1600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.902
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6047
  SUBAREA AREA(ACRES) =    50.00   SUBAREA RUNOFF(CFS) =65.29
  TOTAL AREA(ACRES) =    183.64   TOTAL RUNOFF(CFS) =  322.26
  TC(MIN.) =  14.62

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.62
  RAINFALL INTENSITY(INCH/HR) =2.90
  TOTAL STREAM AREA(ACRES) =   183.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    322.26

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      105.72    15.45        2.800         83.90
      2      147.66    27.59        1.926        127.10
      3      322.26    14.62        2.902        183.64

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      500.54    14.62       2.902
      2      499.39    15.45       2.800
      3      434.33    27.59       1.926

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    500.54   Tc(MIN.) =   14.62
  TOTAL AREA(ACRES) =    394.64
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    500.00 =  5243.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =    394.64  TC(MIN.) =     14.62
  PEAK FLOW RATE(CFS)   =    500.54
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Total Existing 50-Year, 6-hour flow to Wolf Canyon = 322.3 CFS
Tc = 14.6 min
Total Area = 183.6 acres

```
****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7670
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =   11.430
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.864
  SUBAREA RUNOFF(CFS) =    265.69
  TOTAL AREA(ACRES) =     89.64   TOTAL RUNOFF(CFS) =    265.69

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.86  DOWNSTREAM(FEET) =   437.26
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  42.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =17.87
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    265.69
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  11.52
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    400.00 =  1600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.844
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6626
  SUBAREA AREA(ACRES) =   44.00   SUBAREA RUNOFF(CFS) =   76.11
  TOTAL AREA(ACRES) =    133.64   TOTAL RUNOFF(CFS) =  340.41
  TC(MIN.) =  11.52

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    410.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    437.26  DOWNSTREAM(FEET) =    367.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1500.00   CHANNEL SLOPE =  0.0468
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0468 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    340.41
  FLOW VELOCITY(FEET/SEC) =   8.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.96   Tc(MIN.) =  14.49
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  3100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.317
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6047
  SUBAREA AREA(ACRES) =    50.00   SUBAREA RUNOFF(CFS) =74.63
  TOTAL AREA(ACRES) =    183.64   TOTAL RUNOFF(CFS) =  368.34
  TC(MIN.) =  14.49

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.49
  RAINFALL INTENSITY(INCH/HR) =3.32
  TOTAL STREAM AREA(ACRES) =   183.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    368.34

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      122.30    15.03        3.239         83.90
      2      169.10    27.08        2.215        127.10
      3      368.34    14.49        3.317        183.64

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      576.68    14.49       3.317
      2      575.85    15.03       3.239
      3      498.74    27.08       2.215

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    576.68   Tc(MIN.) =   14.49
  TOTAL AREA(ACRES) =    394.64
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    500.00 =  5243.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =    394.64  TC(MIN.) =     14.49
  PEAK FLOW RATE(CFS)   =    576.68
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Total Existing 100-Year, 6-hour flow to Wolf Canyon = 368.3 CFS
Tc = 14.5 min
Total Area = 183.6 acres

Appendix B

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                              Analysis prepared by:

 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                            *
* PRELIMINARY HYDROLOGY, EXISTING CONDITION                             *
* Q2                                                                    *
 ************************************************************************

  FILE NAME: 8020E2.DAT
  TIME/DATE OF STUDY: 16:29 01/31/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  6-HOUR DURATION PRECIPITATION (INCHES) =    1.100
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    110.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.898
  SUBAREA RUNOFF(CFS) =     10.43
  TOTAL AREA(ACRES) =      8.00   TOTAL RUNOFF(CFS) =     10.43

**************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =    356.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2067.00    CHANNEL SLOPE =  0.0731
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0731 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =     10.43
  FLOW VELOCITY(FEET/SEC) =   3.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  10.42  Tc(MIN.) =  15.42
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =  3567.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.401
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   50.50   SUBAREA RUNOFF(CFS) =   31.85
  TOTAL AREA(ACRES) =     58.50   TOTAL RUNOFF(CFS) =   36.89
  TC(MIN.) =  15.42

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    310.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE =  0.0597
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     36.89
  FLOW VELOCITY(FEET/SEC.) =   4.84   FLOW DEPTH(FEET) =   0.62
  TRAVEL TIME(MIN.) =   2.65   Tc(MIN.) =  18.07
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =  4337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.265
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   25.40   SUBAREA RUNOFF(CFS) =   14.46
  TOTAL AREA(ACRES) =     83.90   TOTAL RUNOFF(CFS) =   47.77
  TC(MIN.) =  18.07

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  18.07
  RAINFALL INTENSITY(INCH/HR) =   1.27
  TOTAL STREAM AREA(ACRES) =
  83.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     47.77
```

Total Existing 2-Year,
6-hour flow to Otay River(Basin A) = 47.8 CFS
Tc = 18.1 min
Total Area = 83.9 acres

```
 FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .9210
 S.C.S. CURVE NUMBER (AMC II) =   0
 USER SPECIFIED Tc(MIN.) =   16.350
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.350
 SUBAREA RUNOFF(CFS) =     24.99
 TOTAL AREA(ACRES) =     20.10   TOTAL RUNOFF(CFS) =     24.99

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   514.40  DOWNSTREAM(FEET) =   513.90
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =6.50
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     24.99
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =  16.61
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    300.00 =   870.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.336
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5531
 SUBAREA AREA(ACRES) =   71.70   SUBAREA RUNOFF(CFS) =   43.11
 TOTAL AREA(ACRES) =     91.80   TOTAL RUNOFF(CFS) =   67.85
 TC(MIN.) =  16.61

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    310.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    514.40  DOWNSTREAM(FEET) =    350.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2493.00    CHANNEL SLOPE =  0.0659
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0659 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     67.85
 FLOW VELOCITY(FEET/SEC) =   5.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   7.09  Tc(MIN.) =  23.70
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =  3363.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.062
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5245
  SUBAREA AREA(ACRES) =    35.30   SUBAREA RUNOFF(CFS) =   16.87
  TOTAL AREA(ACRES) =    127.10   TOTAL RUNOFF(CFS) =   70.82
  TC(MIN.) =  23.70

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    276.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1880.00   CHANNEL SLOPE =  0.0390
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0390 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     70.82
  FLOW VELOCITY(FEET/SEC) =   4.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.86  Tc(MIN.) =  30.56
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  5243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =  30.56
  RAINFALL INTENSITY(INCH/HR) =   0.90
  TOTAL STREAM AREA(ACRES) =   127.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     70.82

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    330.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    276.00  DOWNSTREAM(FEET) =    200.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1720.00   CHANNEL SLOPE =  0.0442
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.080   MAXIMUM DEPTH(FEET) =  10.00
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.800
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     74.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.58
  AVERAGE FLOW DEPTH(FEET) =   2.21   TRAVEL TIME(MIN.) =   6.26
  Tc(MIN.) =  36.82
  SUBAREA AREA(ACRES) =    17.20       SUBAREA RUNOFF(CFS) =    8.25
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.533
  TOTAL AREA(ACRES) =    144.30         PEAK FLOW RATE(CFS) =      70.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.15   FLOW VELOCITY(FEET/SEC.) =   4.52
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    330.00 =  1720.00 FEET.
```

Total Existing 2-Year,
6-hour flow to Otay River(Basin B) = 70.8 CFS
Tc = 30.6 min
Total Area = 127.1 acres

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                           Analysis prepared by:

  ************************* DESCRIPTION OF STUDY *************************
 * OTAY LANDS PARCEL B, 08020                                             *
 * PRELIMINARY HYDROLOGY, EXISTING CONDITION                              *
 * Q10                                                                    *
  ************************************************************************

  FILE NAME: 8020E10.DAT
  TIME/DATE OF STUDY: 16:30 01/31/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.700
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    110.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  SUBAREA RUNOFF(CFS) =     16.12
  TOTAL AREA(ACRES) =      8.00   TOTAL RUNOFF(CFS) =     16.12

**************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =    356.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2067.00    CHANNEL SLOPE =  0.0731
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0731 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =     16.12
  FLOW VELOCITY(FEET/SEC) =   3.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.02  Tc(MIN.) =  14.02
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =  3567.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.304
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   50.50   SUBAREA RUNOFF(CFS) =   52.35
  TOTAL AREA(ACRES) =     58.50   TOTAL RUNOFF(CFS) =   60.64
  TC(MIN.) =  14.02

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    310.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE =  0.0597
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     60.64
  FLOW VELOCITY(FEET/SEC.) =   5.47   FLOW DEPTH(FEET) =   0.78
  TRAVEL TIME(MIN.) =   2.35   Tc(MIN.) =  16.36
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =  4337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.085
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   25.40   SUBAREA RUNOFF(CFS) =   23.83
  TOTAL AREA(ACRES) =     83.90   TOTAL RUNOFF(CFS) =   78.71
  TC(MIN.) =  16.36

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  16.36
  RAINFALL INTENSITY(INCH/HR) =   2.08
  TOTAL STREAM AREA(ACRES) =
  83.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     78.71

****************************************************************************
```

Total Existing 10-Year,
6-hour flow to Otay River(Basin A) = 78.7 CFS
Tc = 16.4 min
Total Area = 83.9 acres

```
****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .9210
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =   16.350
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.086
  SUBAREA RUNOFF(CFS) =     38.62
  TOTAL AREA(ACRES) =     20.10   TOTAL RUNOFF(CFS) =     38.62

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   514.40  DOWNSTREAM(FEET) =   513.90
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =7.12
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     38.62
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =  16.58
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    300.00 =   870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.067
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5531
  SUBAREA AREA(ACRES) =   71.70   SUBAREA RUNOFF(CFS) =   66.69
  TOTAL AREA(ACRES) =     91.80   TOTAL RUNOFF(CFS) =  104.95
  TC(MIN.) =  16.58

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    310.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    514.40  DOWNSTREAM(FEET) =    350.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2493.00   CHANNEL SLOPE =  0.0659
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0659 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    104.95
  FLOW VELOCITY(FEET/SEC) =   6.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.13   Tc(MIN.) =  22.72
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =  3363.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.687
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5245
```

```
  SUBAREA AREA(ACRES) =   35.30   SUBAREA RUNOFF(CFS) =   26.80
  TOTAL AREA(ACRES) =    127.10   TOTAL RUNOFF(CFS) =  112.47
  TC(MIN.) =  22.72

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    276.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1880.00    CHANNEL SLOPE =  0.0390
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0390 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    112.47
  FLOW VELOCITY(FEET/SEC) =   5.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.88   Tc(MIN.) =  28.60
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  5243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =  28.60
  RAINFALL INTENSITY(INCH/HR) =1.45
  TOTAL STREAM AREA(ACRES) =   127.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    112.47


****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    330.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    276.00  DOWNSTREAM(FEET) =    200.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1720.00    CHANNEL SLOPE =  0.0442
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.080   MAXIMUM DEPTH(FEET) =  10.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.297
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    119.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.16
  AVERAGE FLOW DEPTH(FEET) =   2.73   TRAVEL TIME(MIN.) =   5.55
  Tc(MIN.) =  34.15
  SUBAREA AREA(ACRES) =    17.20       SUBAREA RUNOFF(CFS) =   13.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.533
  TOTAL AREA(ACRES) =    144.30         PEAK FLOW RATE(CFS) =     112.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.66   FLOW VELOCITY(FEET/SEC.) =   5.08
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    330.00 =  1720.00 FEET.
```

Total Existing 10-Year,
6-hour flow to Otay River(Basin B) = 112.5 CFS
Tc = 28.6 min
Total Area = 127.1 acres

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                              Analysis prepared by:

 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                            *
* PRELIMINARY HYDROLOGY, EXISTING CONDITION                             *
* Q25                                                                   *
 ************************************************************************

  FILE NAME: 8020E25.DAT
  TIME/DATE OF STUDY: 16:28 01/31/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  25.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.800
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    110.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.743
  SUBAREA RUNOFF(CFS) =     17.07
  TOTAL AREA(ACRES) =      8.00   TOTAL RUNOFF(CFS) =     17.07

**************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =    356.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2067.00    CHANNEL SLOPE =  0.0731
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0731 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =     17.07
  FLOW VELOCITY(FEET/SEC) =   3.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.85  Tc(MIN.) =  13.85
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =  3567.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.458
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   50.50   SUBAREA RUNOFF(CFS) =   55.87
  TOTAL AREA(ACRES) =     58.50   TOTAL RUNOFF(CFS) =   64.72
  TC(MIN.) =  13.85

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    310.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE =  0.0597
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     64.72
  FLOW VELOCITY(FEET/SEC.) =   5.56   FLOW DEPTH(FEET) =   0.80
  TRAVEL TIME(MIN.) =   2.31   Tc(MIN.) =  16.16
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =  4337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.226
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   25.40   SUBAREA RUNOFF(CFS) =   25.44
  TOTAL AREA(ACRES) =     83.90   TOTAL RUNOFF(CFS) =   84.03
  TC(MIN.) =  16.16

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  16.16
  RAINFALL INTENSITY(INCH/HR) =   2.23
  TOTAL STREAM AREA(ACRES) =    83.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     84.03
```

Total Existing 25-Year,
6-hour flow to Otay River(Basin A) = 84.0 CFS
Tc = 16.2 min
Total Area = 83.9 acres

```
****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .9210
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =   16.350
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.209
  SUBAREA RUNOFF(CFS) =     40.89
  TOTAL AREA(ACRES) =     20.10   TOTAL RUNOFF(CFS) =     40.89

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   514.40  DOWNSTREAM(FEET) =   513.90
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =7.18
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     40.89
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =  16.58
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    300.00 =   870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.189
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5531
  SUBAREA AREA(ACRES) =   71.70   SUBAREA RUNOFF(CFS) =   70.62
  TOTAL AREA(ACRES) =     91.80   TOTAL RUNOFF(CFS) =  111.13
  TC(MIN.) =  16.58

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    310.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    514.40  DOWNSTREAM(FEET) =    350.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2493.00    CHANNEL SLOPE =  0.0659
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0659 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    111.13
  FLOW VELOCITY(FEET/SEC) =   6.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.02   Tc(MIN.) =  22.60
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =  3363.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.792
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5245
```

```
  SUBAREA AREA(ACRES) =   35.30   SUBAREA RUNOFF(CFS) =   28.47
  TOTAL AREA(ACRES) =    127.10   TOTAL RUNOFF(CFS) =  119.48
  TC(MIN.) =  22.60

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    276.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1880.00    CHANNEL SLOPE =  0.0390
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0390 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    119.48
  FLOW VELOCITY(FEET/SEC) =   5.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.76   Tc(MIN.) =  28.36
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  5243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =  28.36
  RAINFALL INTENSITY(INCH/HR) =1.55
  TOTAL STREAM AREA(ACRES) =   127.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    119.48

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    330.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    276.00  DOWNSTREAM(FEET) =    200.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1720.00    CHANNEL SLOPE =  0.0442
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.080   MAXIMUM DEPTH(FEET) =  10.00
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.382
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    126.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.24
  AVERAGE FLOW DEPTH(FEET) =   2.80   TRAVEL TIME(MIN.) =   5.47
  Tc(MIN.) =  33.83
  SUBAREA AREA(ACRES) =    17.20       SUBAREA RUNOFF(CFS) =   14.26
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.533
  TOTAL AREA(ACRES) =    144.30         PEAK FLOW RATE(CFS) =     119.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.73   FLOW VELOCITY(FEET/SEC.) =   5.16
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    330.00 =  1720.00 FEET.
```

Total Existing 25-Year,
6-hour flow to Otay River(Basin B) = 119.5 CFS
Tc = 28.4 min
Total Area = 127.1 acres

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                           Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                             *
* PRELIMINARY HYDROLOGY, EXISTING CONDITION                              *
* Q50                                                                    *
 ************************************************************************

  FILE NAME: 8020E50.DAT
  TIME/DATE OF STUDY: 16:27 01/31/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    110.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.796
  SUBAREA RUNOFF(CFS) =     20.87
  TOTAL AREA(ACRES) =      8.00   TOTAL RUNOFF(CFS) =     20.87

**************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =    356.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2067.00   CHANNEL SLOPE =  0.0731
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0731 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     20.87
  FLOW VELOCITY(FEET/SEC) =   4.16 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.28  Tc(MIN.) =  13.28
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =  3567.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.088
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   50.50   SUBAREA RUNOFF(CFS) =   70.17
  TOTAL AREA(ACRES) =     58.50   TOTAL RUNOFF(CFS) =   81.28
  TC(MIN.) =  13.28

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    310.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE =  0.0597
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     81.28
  FLOW VELOCITY(FEET/SEC.) =   5.91   FLOW DEPTH(FEET) =   0.88
  TRAVEL TIME(MIN.) =   2.17   Tc(MIN.) =  15.45
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =  4337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.800
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   25.40   SUBAREA RUNOFF(CFS) =32.01
  TOTAL AREA(ACRES) =     83.90   TOTAL RUNOFF(CFS) =  105.72
  TC(MIN.) =  15.45

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  15.45
  RAINFALL INTENSITY(INCH/HR) =   2.80
  TOTAL STREAM AREA(ACRES) =    83.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    105.72
```

Total Existing 50-Year,
6-hour flow to Otay River(Basin A) = 105.7 CFS
Tc = 15.5 min
Total Area = 83.9 acres

```
****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .9210
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =   16.350
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.699
  SUBAREA RUNOFF(CFS) =     49.97
  TOTAL AREA(ACRES) =     20.10   TOTAL RUNOFF(CFS) =     49.97

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   514.40  DOWNSTREAM(FEET) =   513.90
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.07
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  36.00  NUMBER OF PIPES =  1
  PIPE-FLOW(CFS) =     49.97
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =  16.59
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    300.00 =   870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.675
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5531
  SUBAREA AREA(ACRES) =   71.70   SUBAREA RUNOFF(CFS) =   86.30
  TOTAL AREA(ACRES) =     91.80   TOTAL RUNOFF(CFS) =  135.81
  TC(MIN.) =  16.59

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    310.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    514.40  DOWNSTREAM(FEET) =    350.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2493.00   CHANNEL SLOPE =  0.0659
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0659 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    135.81
  FLOW VELOCITY(FEET/SEC) =   7.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.63   Tc(MIN.) =  22.22
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =  3363.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.215
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5245
  SUBAREA AREA(ACRES) =    35.30   SUBAREA RUNOFF(CFS) =35.19
  TOTAL AREA(ACRES) =    127.10   TOTAL RUNOFF(CFS) =  147.66
  TC(MIN.) =  22.22

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    276.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1880.00    CHANNEL SLOPE =  0.0390
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0390 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    147.66
  FLOW VELOCITY(FEET/SEC) =   5.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.37   Tc(MIN.) =  27.59
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  5243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =  27.59
  RAINFALL INTENSITY(INCH/HR) =1.93
  TOTAL STREAM AREA(ACRES) =   127.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    147.66

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    330.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    276.00  DOWNSTREAM(FEET) =    200.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1720.00    CHANNEL SLOPE =  0.0442
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.080   MAXIMUM DEPTH(FEET) =  10.00
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.724
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    156.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.53
  AVERAGE FLOW DEPTH(FEET) =   3.09   TRAVEL TIME(MIN.) =   5.19
  Tc(MIN.) =  32.77
  SUBAREA AREA(ACRES) =    17.20       SUBAREA RUNOFF(CFS) =   17.79
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.533
  TOTAL AREA(ACRES) =    144.30         PEAK FLOW RATE(CFS) =     147.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.01   FLOW VELOCITY(FEET/SEC.) =   5.44
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    330.00 =  1720.00 FEET.
```

Total Existing 50-Year,
6-hour flow to Otay River(Basin B) = 147.7 CFS
Tc = 27.6 min
Total Area = 127.1 acres

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                              Analysis prepared by:

 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                            *
* PRELIMINARY HYDROLOGY, EXISTING CONDITION                             *
* Q100                                                                  *
 ************************************************************************

  FILE NAME: 8020E100.DAT
  TIME/DATE OF STUDY: 15:36 01/31/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    110.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.587
  SUBAREA RUNOFF(CFS) =     23.71
  TOTAL AREA(ACRES) =      8.00   TOTAL RUNOFF(CFS) =     23.71

**************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =    356.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2067.00   CHANNEL SLOPE =  0.0731
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0731 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =     23.71
  FLOW VELOCITY(FEET/SEC) =   4.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.93  Tc(MIN.) =  12.93
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =  3567.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.569
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   50.50   SUBAREA RUNOFF(CFS) =   81.10
  TOTAL AREA(ACRES) =     58.50   TOTAL RUNOFF(CFS) =   93.95
  TC(MIN.) =  12.93

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    310.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE =  0.0597
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     93.95
  FLOW VELOCITY(FEET/SEC.) =   6.12   FLOW DEPTH(FEET) =   0.94
  TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =  15.03
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =  4337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.239
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   25.40   SUBAREA RUNOFF(CFS) =37.02
  TOTAL AREA(ACRES) =     83.90   TOTAL RUNOFF(CFS) =  122.30
  TC(MIN.) =  15.03

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  15.03
  RAINFALL INTENSITY(INCH/HR) =   3.24
  TOTAL STREAM AREA(ACRES) =    83.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    122.30

****************************************************************************
```

Total Existing 100-Year,
6-hour flow to Otay River(Basin A) = 122.3 CFS
Tc = 15.0 min
Total Area = 83.9 acres

```
****************************************************************************
   FLOW PROCESS FROM NODE    500.00 TO NODE    330.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    276.00  DOWNSTREAM(FEET) =    200.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1720.00    CHANNEL SLOPE =  0.0442
   CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
   MANNING'S FACTOR = 0.080   MAXIMUM DEPTH(FEET) =  10.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.986
   *USER SPECIFIED(SUBAREA):
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6000
   S.C.S. CURVE NUMBER (AMC II) =   0
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     179.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    5.73
   AVERAGE FLOW DEPTH(FEET) =   3.28    TRAVEL TIME(MIN.) =   5.01
   Tc(MIN.) =  32.09
   SUBAREA AREA(ACRES) =    17.20        SUBAREA RUNOFF(CFS) =   20.49
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.533
   TOTAL AREA(ACRES) =    144.30          PEAK FLOW RATE(CFS) =     169.10

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  3.19   FLOW VELOCITY(FEET/SEC.) =   5.64
   LONGEST FLOWPATH FROM NODE      0.00 TO NODE    330.00 =  1720.00 FEET.
```

Total Existing 100-Year,
6-hour flow to Otay River(Basin A) = 122.3 CFS
Tc = 15.0 min
Total Area = 83.9 acres

```
 FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .9210
 S.C.S. CURVE NUMBER (AMC II) =   0
 USER SPECIFIED Tc(MIN.) =   16.350
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.068
 SUBAREA RUNOFF(CFS) =     56.79
 TOTAL AREA(ACRES) =     20.10   TOTAL RUNOFF(CFS) =     56.79

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   514.40  DOWNSTREAM(FEET) =   513.90
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.03
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  36.00  NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =     56.79
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =  16.56
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    300.00 =   870.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.043
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5531
 SUBAREA AREA(ACRES) =   71.70   SUBAREA RUNOFF(CFS) =   98.17
 TOTAL AREA(ACRES) =     91.80   TOTAL RUNOFF(CFS) =  154.50
 TC(MIN.) =  16.56

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    310.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    514.40  DOWNSTREAM(FEET) =    350.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2493.00   CHANNEL SLOPE =  0.0659
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0659 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =    154.50
 FLOW VELOCITY(FEET/SEC) =   7.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.39   Tc(MIN.) =  21.95
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =  3363.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.537
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5245
  SUBAREA AREA(ACRES) =    35.30   SUBAREA RUNOFF(CFS) =40.30
  TOTAL AREA(ACRES) =    127.10   TOTAL RUNOFF(CFS) =  169.10
  TC(MIN.) =  21.95

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    276.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1880.00    CHANNEL SLOPE =  0.0390
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0390 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    169.10
  FLOW VELOCITY(FEET/SEC) =   6.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.13   Tc(MIN.) =  27.08
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  5243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  27.08
  RAINFALL INTENSITY(INCH/HR) =2.22
  TOTAL STREAM AREA(ACRES) =   127.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    169.10
```

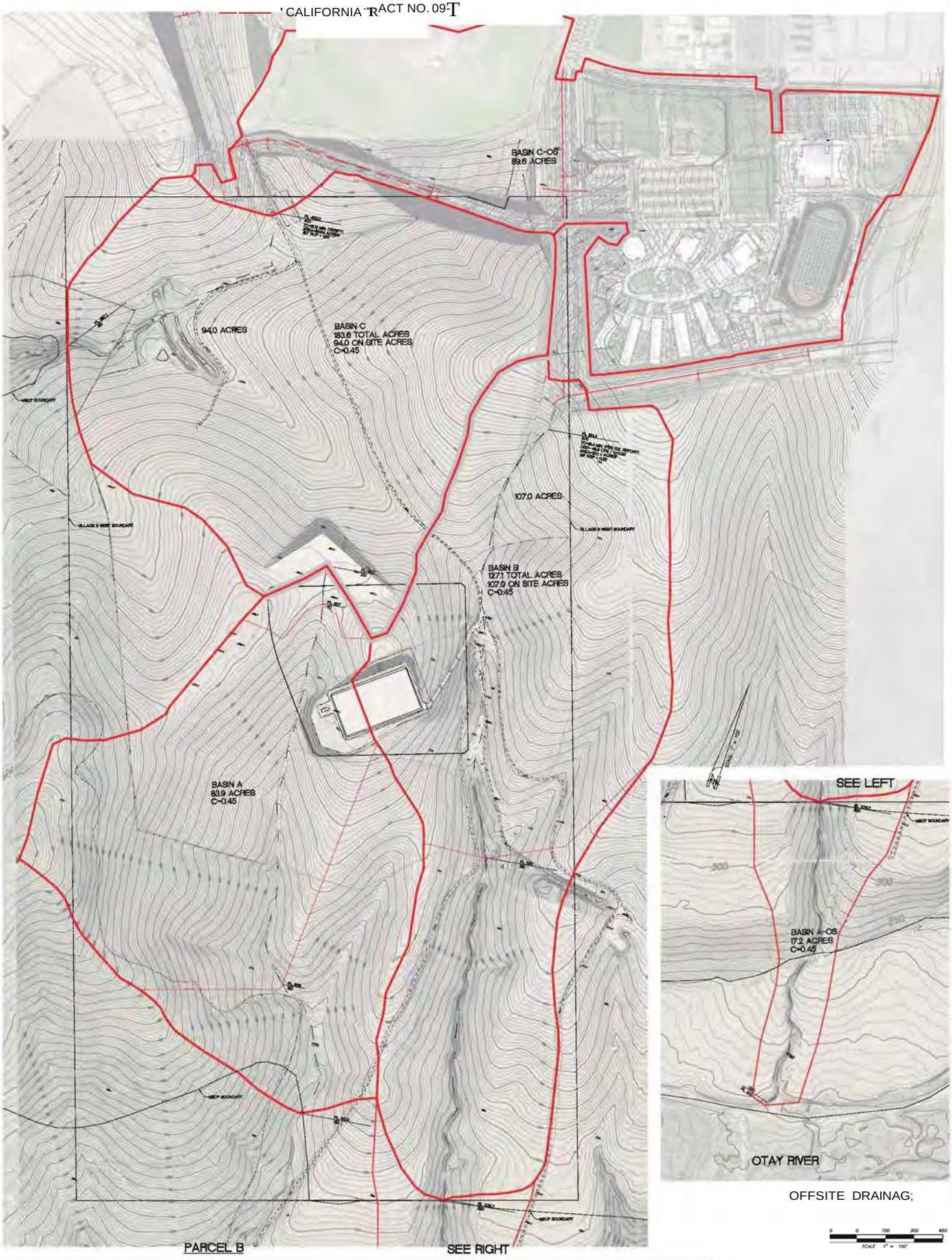
Total Existing 100-Year,
6-hour flow to Otay River(Basin B) = 169.1 CFS
Tc = 27.1 min
Total Area = 127.1 acres

Appendix C

PRE PROJECT OTAY RANCH V DRAINAGE MAP

CITY OF CHULA VISTA ' ILLAGE 8 WES

' CALIFORNIA ' R ACT NO. 09-T



OFFSITE DRAINAG;

Appendix D

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                             *
* PRELIMINARY PROPOSED HYDROLOGY                                         *
* Q2                                                                     *
 ************************************************************************

  FILE NAME: 8020P2.DAT
  TIME/DATE OF STUDY: 09:57 02/02/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =   2.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.100
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7670
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =   11.430
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.700
  SUBAREA RUNOFF(CFS) =    116.90
  TOTAL AREA(ACRES) =     89.64   TOTAL RUNOFF(CFS) =    116.90

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    405.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.86  DOWNSTREAM(FEET) =   429.00
  FLOW LENGTH(FEET) =   660.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  25.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.40
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    116.90
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =  12.19
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    405.00 =  1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.631
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7706
  SUBAREA AREA(ACRES) =    3.21   SUBAREA RUNOFF(CFS) =    4.55
  TOTAL AREA(ACRES) =     92.85   TOTAL RUNOFF(CFS) =  116.90
  TC(MIN.) =  12.19
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   429.00  DOWNSTREAM(FEET) =   427.50
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  25.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.93
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    116.90
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  12.30
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  1471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.622
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7730
  SUBAREA AREA(ACRES) =    2.35   SUBAREA RUNOFF(CFS) =    3.32
  TOTAL AREA(ACRES) =     95.20   TOTAL RUNOFF(CFS) =  119.37
  TC(MIN.) =  12.30

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.30
  RAINFALL INTENSITY(INCH/HR) =   1.62
  TOTAL STREAM AREA(ACRES) =    95.20
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    119.37

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    415.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    7.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.333
  SUBAREA RUNOFF(CFS) =     34.98
  TOTAL AREA(ACRES) =     18.98   TOTAL RUNOFF(CFS) =     34.98

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    420.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   476.00  DOWNSTREAM(FEET) =   474.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =13.54
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     34.98
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   7.09
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    420.00 =   161.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    425.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   474.00  DOWNSTREAM(FEET) =   462.00
  FLOW LENGTH(FEET) =   343.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.57
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     34.98
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   7.48
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    425.00 =   504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.235
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8023
  SUBAREA AREA(ACRES) =     3.45   SUBAREA RUNOFF(CFS) =     6.71
  TOTAL AREA(ACRES) =     22.43   TOTAL RUNOFF(CFS) =   40.23
  TC(MIN.) =   7.48

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.235
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7996
  SUBAREA AREA(ACRES) =   6.36    SUBAREA RUNOFF(CFS) =   11.23
  TOTAL AREA(ACRES) =     28.79   TOTAL RUNOFF(CFS) =   51.46
  TC(MIN.) =   7.48

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.235
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7986
  SUBAREA AREA(ACRES) =    3.40   SUBAREA RUNOFF(CFS) =    6.00
  TOTAL AREA(ACRES) =     32.19   TOTAL RUNOFF(CFS) =   57.46
  TC(MIN.) =   7.48

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    426.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   462.00  DOWNSTREAM(FEET) =   456.00
  FLOW LENGTH(FEET) =   356.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  20.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.64
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     57.46
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   7.95
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    426.00 =   860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.149
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7952
  SUBAREA AREA(ACRES) =    1.26   SUBAREA RUNOFF(CFS) =    1.92
  TOTAL AREA(ACRES) =     33.45   TOTAL RUNOFF(CFS) =   57.46
  TC(MIN.) =   7.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.149
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7949
  SUBAREA AREA(ACRES) =    2.22   SUBAREA RUNOFF(CFS) =    3.77
  TOTAL AREA(ACRES) =     35.67   TOTAL RUNOFF(CFS) =   60.94
  TC(MIN.) =   7.95

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.149
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7980
  SUBAREA AREA(ACRES) =    1.51   SUBAREA RUNOFF(CFS) =    2.82
  TOTAL AREA(ACRES) =     37.18   TOTAL RUNOFF(CFS) =   63.77
  TC(MIN.) =   7.95

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    410.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   456.00  DOWNSTREAM(FEET) =   429.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.27
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     63.77
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   7.98
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    410.00 =   935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.98
  RAINFALL INTENSITY(INCH/HR) =   2.14
  TOTAL STREAM AREA(ACRES) =    37.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     63.77

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      119.37    12.30        1.622         95.20
      2       63.77     7.98        2.144         37.18

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      141.24     7.98       2.144
      2      167.62    12.30       1.622

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    167.62   Tc(MIN.) =   12.30
  TOTAL AREA(ACRES) =      132.38
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  1471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    600.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   427.50  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =   830.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  30.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.34
  GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    167.62
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =  13.20
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    600.00 =  2301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.550
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7802
  SUBAREA AREA(ACRES) =    2.11   SUBAREA RUNOFF(CFS) =    2.58
  TOTAL AREA(ACRES) =    134.49   TOTAL RUNOFF(CFS) =  167.62
  TC(MIN.) =  13.20
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    505.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. POOR COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  89
  USER SPECIFIED Tc(MIN.) =    5.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.898
  SUBAREA RUNOFF(CFS) =      1.31
  TOTAL AREA(ACRES) =      1.29   TOTAL RUNOFF(CFS) =      1.31

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.898
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5700
  SUBAREA AREA(ACRES) =    1.29   SUBAREA RUNOFF(CFS) =    2.95
  TOTAL AREA(ACRES) =      2.58   TOTAL RUNOFF(CFS) =    4.26
  TC(MIN.) =   5.00

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   531.00  DOWNSTREAM(FEET) =   508.00
  FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.44
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.26
  PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =   6.24
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =  1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   508.00  DOWNSTREAM(FEET) =   501.50
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =       9.56
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.26
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   6.46
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    515.00 =  1585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    515.00 TO NODE    515.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.456
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6593
  SUBAREA AREA(ACRES) =    4.54   SUBAREA RUNOFF(CFS) =    7.92
  TOTAL AREA(ACRES) =      7.12   TOTAL RUNOFF(CFS) =   11.53
  TC(MIN.) =   6.46

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    524.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   501.50  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   219.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.78
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.53
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   6.75
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    524.00 =  1804.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    524.00 TO NODE    525.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   414.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.05
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.53
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   7.28
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =  2218.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    535.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.898
  SUBAREA RUNOFF(CFS) =      6.23
  TOTAL AREA(ACRES) =      3.03   TOTAL RUNOFF(CFS) =      6.23

****************************************************************************
  FLOW PROCESS FROM NODE    535.00 TO NODE    540.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  507.00  DOWNSTREAM ELEVATION(FEET) =  502.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.24
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.83
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.93
  STREET FLOW TRAVEL TIME(MIN.) =   1.74   Tc(MIN.) =   6.74
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.391
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.02
  TOTAL AREA(ACRES) =      3.04        PEAK FLOW RATE(CFS) =       6.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.83
  FLOW VELOCITY(FEET/SEC.) =  2.87   DEPTH*VELOCITY(FT*FT/SEC.) =   0.93
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    540.00 =   714.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    540.00 TO NODE    545.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   497.00  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   412.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.92
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.23
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   7.31
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    545.00 =  1126.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    545.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   1 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.31
  RAINFALL INTENSITY(INCH/HR) =   2.27
  TOTAL STREAM AREA(ACRES) =     3.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.23

****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    550.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.898
  SUBAREA RUNOFF(CFS) =      8.89
  TOTAL AREA(ACRES) =      4.32   TOTAL RUNOFF(CFS) =      8.89

****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    551.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  493.00  DOWNSTREAM ELEVATION(FEET) =  478.50
  STREET LENGTH(FEET) =   740.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.89
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   12.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.15
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   3.91   Tc(MIN.) =   8.91
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.997
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.00      SUBAREA RUNOFF(CFS) =    0.00
  TOTAL AREA(ACRES) =      4.32        PEAK FLOW RATE(CFS) =       8.89

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.58
  FLOW VELOCITY(FEET/SEC.) =  3.15   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    551.00 =  1040.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    551.00 TO NODE    545.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   473.50  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =6.51
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.89
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   9.81
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    545.00 =  1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    545.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.81
  RAINFALL INTENSITY(INCH/HR) =   1.88
  TOTAL STREAM AREA(ACRES) =     4.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.89

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        6.23     7.31        2.268          3.04
      2        8.89     9.81        1.877          4.32

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       12.87     7.31       2.268
      2       14.05     9.81       1.877

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     14.05   Tc(MIN.) =    9.81
  TOTAL AREA(ACRES) =      7.36
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    545.00 =  1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    555.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   470.00  DOWNSTREAM(FEET) =   469.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.66
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.05
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   9.89
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    555.00 =  1436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    555.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.867
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =     4.45   SUBAREA RUNOFF(CFS) =    5.90
  TOTAL AREA(ACRES) =     11.81   TOTAL RUNOFF(CFS) =   15.66
  TC(MIN.) =   9.89

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    525.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   469.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   201.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =      7.48
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     15.66
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =  10.33
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    525.00 =  1637.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       15.66    10.33       1.815       11.81
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    525.00 =  1637.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       11.53     7.28       2.275        7.12
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =  2218.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc     INTENSITY
  NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
      1      22.55       7.28        2.275
      2      24.85      10.33        1.815

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     24.85   Tc(MIN.) =   10.33
  TOTAL AREA(ACRES) =       18.93

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    560.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   467.00  DOWNSTREAM(FEET) =   465.30
```

```
  FLOW LENGTH(FEET) =   170.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =8.41
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     24.85
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =  10.67
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    560.00 =  2388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    560.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.777
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6948
  SUBAREA AREA(ACRES) =    4.89   SUBAREA RUNOFF(CFS) =    6.17
  TOTAL AREA(ACRES) =     23.82   TOTAL RUNOFF(CFS) =   29.42
  TC(MIN.) =  10.67

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    570.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   465.30  DOWNSTREAM(FEET) =   464.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.77
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.42
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  10.79
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    570.00 =  2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    570.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.765
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7309
  SUBAREA AREA(ACRES) =   14.54   SUBAREA RUNOFF(CFS) =   20.27
  TOTAL AREA(ACRES) =     38.36   TOTAL RUNOFF(CFS) =   49.49
  TC(MIN.) =  10.79

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    575.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   464.00  DOWNSTREAM(FEET) =   460.00
  FLOW LENGTH(FEET) =   488.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  21.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.28
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     49.49
  PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =  11.66
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    575.00 =  2951.00 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    575.00 TO NODE    575.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.678
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7347
  SUBAREA AREA(ACRES) =    1.07   SUBAREA RUNOFF(CFS) =    1.56
  TOTAL AREA(ACRES) =     39.43   TOTAL RUNOFF(CFS) =   49.49
  TC(MIN.) =  11.66
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    580.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   460.00  DOWNSTREAM(FEET) =   458.00
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.52
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     49.49
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  11.70
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    580.00 =  2987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.70
  RAINFALL INTENSITY(INCH/HR) =   1.68
  TOTAL STREAM AREA(ACRES) =    39.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     49.49

****************************************************************************
  FLOW PROCESS FROM NODE    581.00 TO NODE    585.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    6.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.577
  SUBAREA RUNOFF(CFS) =      7.78
  TOTAL AREA(ACRES) =      3.82   TOTAL RUNOFF(CFS) =      7.78

****************************************************************************
  FLOW PROCESS FROM NODE    585.00 TO NODE    585.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.577
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8188
  SUBAREA AREA(ACRES) =    2.15   SUBAREA RUNOFF(CFS) =    4.82
  TOTAL AREA(ACRES) =      5.97   TOTAL RUNOFF(CFS) =   12.60
  TC(MIN.) =   6.00
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    585.00 TO NODE    590.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.00  DOWNSTREAM(FEET) =   461.50
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =10.54
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.60
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   6.36
  LONGEST FLOWPATH FROM NODE    581.00 TO NODE    590.00 =   426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    590.00 TO NODE    580.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   461.50  DOWNSTREAM(FEET) =   458.00
  FLOW LENGTH(FEET) =    71.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =12.08
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.60
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   6.45
  LONGEST FLOWPATH FROM NODE    581.00 TO NODE    580.00 =   497.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.45
  RAINFALL INTENSITY(INCH/HR) =   2.46
  TOTAL STREAM AREA(ACRES) =     5.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.60

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       49.49    11.70        1.675         39.43
      2       12.60     6.45        2.458          5.97

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       39.90     6.45       2.458
      2       58.07    11.70       1.675

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     58.07   Tc(MIN.) =   11.70
  TOTAL AREA(ACRES) =     45.40
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    580.00 =  2987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    595.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   458.00  DOWNSTREAM(FEET) =   443.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  16.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =15.33
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     58.07
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =  12.26
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    595.00 =  3507.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.625
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7481
  SUBAREA AREA(ACRES) =    2.58   SUBAREA RUNOFF(CFS) =    3.31
  TOTAL AREA(ACRES) =     47.98   TOTAL RUNOFF(CFS) =   58.33
  TC(MIN.) =  12.26

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.625
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7619
  SUBAREA AREA(ACRES) =    6.12   SUBAREA RUNOFF(CFS) =    8.65
  TOTAL AREA(ACRES) =     54.10   TOTAL RUNOFF(CFS) =   66.98
  TC(MIN.) =  12.26

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.625
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7643
  SUBAREA AREA(ACRES) =    4.99   SUBAREA RUNOFF(CFS) =    6.41
  TOTAL AREA(ACRES) =     59.09   TOTAL RUNOFF(CFS) =   73.39
  TC(MIN.) =  12.26

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    600.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   443.00  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  11.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.64
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     73.39
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  12.32
```

```
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =  3632.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF     Tc      INTENSITY     AREA
 NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       73.39    12.32       1.620       59.09
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =  3632.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF     Tc      INTENSITY     AREA
 NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      167.62    13.20       1.550      134.49
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    600.00 =  2301.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF        Tc     INTENSITY
 NUMBER    (CFS)       (MIN.)   (INCH/HOUR)
     1     229.90       12.32        1.620
     2     237.84       13.20        1.550

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    237.84   Tc(MIN.) =   13.20
 TOTAL AREA(ACRES) =      193.58

****************************************************************************
 FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.550
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7757
 SUBAREA AREA(ACRES) =    5.14   SUBAREA RUNOFF(CFS) =    6.29
 TOTAL AREA(ACRES) =    198.72   TOTAL RUNOFF(CFS) =  238.89
 TC(MIN.) =  13.20

****************************************************************************
 FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.550
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7760
 SUBAREA AREA(ACRES) =    3.97   SUBAREA RUNOFF(CFS) =    4.86
 TOTAL AREA(ACRES) =    202.69   TOTAL RUNOFF(CFS) =  243.75
 TC(MIN.) =  13.20

****************************************************************************
 FLOW PROCESS FROM NODE    600.00 TO NODE    610.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   416.00  DOWNSTREAM(FEET) =   402.00
 FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.0 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.43
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    243.75
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =  13.37
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    610.00 =  3912.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    620.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   402.00  DOWNSTREAM(FEET) =   366.00
  FLOW LENGTH(FEET) =   720.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  25.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.02
  GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    243.75
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  13.82
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    620.00 =  4632.00 FEET.


****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.504
  *USER SPECIFIED(SUBAREA):
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7741
  SUBAREA AREA(ACRES) =   16.28   SUBAREA RUNOFF(CFS) =   18.37
  TOTAL AREA(ACRES) =    218.97   TOTAL RUNOFF(CFS) =  255.00
  TC(MIN.) =  13.82
```

Park Lot ‘A’ flow confluence, Q=18.37

```
****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      243.75    13.82       1.504      202.69
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    620.00 =  4632.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      155.55    22.16       1.109      177.24
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    620.00 =  6354.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc     INTENSITY
  NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
      1     340.76      13.82       1.504
      2     335.30      22.16       1.109

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    340.76   Tc(MIN.) =   13.82
```

```
  TOTAL AREA(ACRES) =    379.93
 ============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =    379.93  TC(MIN.) =     13.82
  PEAK FLOW RATE(CFS)   =    340.76
 ============================================================================
 ============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Total Proposed 2-Year, 6-hour flow to Wolf Canyon = 243.8 CFS
Tc = 13.8 min
Total Area = 202.6 acres

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                           Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                             *
* PRELIMINARY PROPOSED HYDROLOGY                                         *
* Q10                                                                    *
 ************************************************************************

  FILE NAME: 8020P10.DAT
  TIME/DATE OF STUDY: 09:56 02/02/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.700
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7670
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =   11.430
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.628
  SUBAREA RUNOFF(CFS) =    180.67
  TOTAL AREA(ACRES) =     89.64   TOTAL RUNOFF(CFS) =    180.67

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    405.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.86  DOWNSTREAM(FEET) =   429.00
  FLOW LENGTH(FEET) =   660.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  33.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.06
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    180.67
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =  12.11
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    405.00 =  1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.531
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7706
  SUBAREA AREA(ACRES) =    3.21   SUBAREA RUNOFF(CFS) =    7.07
  TOTAL AREA(ACRES) =     92.85   TOTAL RUNOFF(CFS) =  181.08
  TC(MIN.) =  12.11

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   429.00  DOWNSTREAM(FEET) =   427.50
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  32.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.69
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    181.08
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  12.21
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  1471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.21
  RAINFALL INTENSITY(INCH/HR) =   2.52
  TOTAL STREAM AREA(ACRES) =    92.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    181.08

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    415.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    7.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.605
  SUBAREA RUNOFF(CFS) =     54.06
  TOTAL AREA(ACRES) =     18.98   TOTAL RUNOFF(CFS) =     54.06

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    420.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   476.00  DOWNSTREAM(FEET) =   474.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =15.17
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     54.06
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   7.08
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    420.00 =   161.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    425.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   474.00  DOWNSTREAM(FEET) =   462.00
  FLOW LENGTH(FEET) =   343.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.36
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     54.06
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   7.43
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    425.00 =   504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.470
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8023
  SUBAREA AREA(ACRES) =   3.45    SUBAREA RUNOFF(CFS) =   10.42
  TOTAL AREA(ACRES) =     22.43   TOTAL RUNOFF(CFS) =   62.45
  TC(MIN.) =   7.43

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.470
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7996
  SUBAREA AREA(ACRES) =   6.36    SUBAREA RUNOFF(CFS) =   17.44
  TOTAL AREA(ACRES) =     28.79   TOTAL RUNOFF(CFS) =   79.89
  TC(MIN.) =   7.43

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.470
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7986
  SUBAREA AREA(ACRES) =    3.40   SUBAREA RUNOFF(CFS) =    9.32
  TOTAL AREA(ACRES) =     32.19   TOTAL RUNOFF(CFS) =   89.21
```

```
  TC(MIN.) =   7.43

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    426.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   462.00  DOWNSTREAM(FEET) =   456.00
  FLOW LENGTH(FEET) =   356.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  26.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.02
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     89.21
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   7.85
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    426.00 =   860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.348
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7952
  SUBAREA AREA(ACRES) =    1.26   SUBAREA RUNOFF(CFS) =    3.00
  TOTAL AREA(ACRES) =     33.45   TOTAL RUNOFF(CFS) =   89.21
  TC(MIN.) =   7.85
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.348
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7949
  SUBAREA AREA(ACRES) =    2.22   SUBAREA RUNOFF(CFS) =    5.87
  TOTAL AREA(ACRES) =     35.67   TOTAL RUNOFF(CFS) =   94.94
  TC(MIN.) =   7.85

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.348
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7980
  SUBAREA AREA(ACRES) =    1.51   SUBAREA RUNOFF(CFS) =    4.40
  TOTAL AREA(ACRES) =     37.18   TOTAL RUNOFF(CFS) =   99.34
  TC(MIN.) =   7.85

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    410.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   456.00  DOWNSTREAM(FEET) =   429.00
```

```
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  11.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =44.63
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     99.34
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   7.88
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    410.00 =   935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.88
  RAINFALL INTENSITY(INCH/HR) =   3.34
  TOTAL STREAM AREA(ACRES) =    37.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     99.34

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      181.08    12.21        2.519         92.85
      2       99.34     7.88        3.341         37.18

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      216.21     7.88       3.341
      2      255.98    12.21       2.519

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    255.98   Tc(MIN.) =   12.21
  TOTAL AREA(ACRES) =      130.03
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  1471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.519
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    2.35   SUBAREA RUNOFF(CFS) =    5.15
  TOTAL AREA(ACRES) =    132.38   TOTAL RUNOFF(CFS) =  260.09
  TC(MIN.) =  12.21

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    600.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   427.50  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =   830.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  40.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.04
  GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    260.09
```

```
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =  13.02
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    600.00 =  2301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    505.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. POOR COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  89
  USER SPECIFIED Tc(MIN.) =    5.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  SUBAREA RUNOFF(CFS) =      2.02
  TOTAL AREA(ACRES) =      1.29   TOTAL RUNOFF(CFS) =      2.02

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5700
  SUBAREA AREA(ACRES) =    1.29   SUBAREA RUNOFF(CFS) =    4.56
  TOTAL AREA(ACRES) =      2.58   TOTAL RUNOFF(CFS) =    6.59
  TC(MIN.) =   5.00

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   531.00  DOWNSTREAM(FEET) =   508.00
  FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.57
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.59
  PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =   6.10
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =  1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   508.00  DOWNSTREAM(FEET) =   501.50
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.86
```

```
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.59
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   6.29
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    515.00 =  1585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    515.00 TO NODE    515.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.863
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6593
  SUBAREA AREA(ACRES) =     4.54   SUBAREA RUNOFF(CFS) =   12.45
  TOTAL AREA(ACRES) =      7.12   TOTAL RUNOFF(CFS) =   18.13
  TC(MIN.) =   6.29

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    524.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   501.50  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   219.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.47
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     18.13
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   6.54
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    524.00 =  1804.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    524.00 TO NODE    525.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   414.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.77
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     18.13
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   7.01
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =  2218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    535.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  SUBAREA RUNOFF(CFS) =      9.64
  TOTAL AREA(ACRES) =      3.03   TOTAL RUNOFF(CFS) =      9.64
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    535.00 TO NODE    540.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  507.00  DOWNSTREAM ELEVATION(FEET) =  502.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   14.30
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.94
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.09
  STREET FLOW TRAVEL TIME(MIN.) =   1.70   Tc(MIN.) =   6.70
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.709
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.03
  TOTAL AREA(ACRES) =      3.04        PEAK FLOW RATE(CFS) =       9.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  14.14
  FLOW VELOCITY(FEET/SEC.) =  2.98   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    540.00 =   714.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    540.00 TO NODE    545.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   497.00  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   412.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.42
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.64
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   7.21
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    545.00 =  1126.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    545.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.21
  RAINFALL INTENSITY(INCH/HR) =   3.54
  TOTAL STREAM AREA(ACRES) =     3.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.64
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    550.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  SUBAREA RUNOFF(CFS) =     13.74
  TOTAL AREA(ACRES) =      4.32   TOTAL RUNOFF(CFS) =     13.74

****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    551.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  493.00  DOWNSTREAM ELEVATION(FEET) =  478.50
  STREET LENGTH(FEET) =   740.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.74
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   16.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.34
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.32
  STREET FLOW TRAVEL TIME(MIN.) =   3.69   Tc(MIN.) =   8.69
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.136
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.00      SUBAREA RUNOFF(CFS) =    0.00
  TOTAL AREA(ACRES) =      4.32        PEAK FLOW RATE(CFS) =      13.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  16.95
  FLOW VELOCITY(FEET/SEC.) =  3.34   DEPTH*VELOCITY(FT*FT/SEC.) =   1.32
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    551.00 =  1040.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    551.00 TO NODE    545.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   473.50  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =      7.25
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     13.74
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =   9.50
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    545.00 =  1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    545.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.50
  RAINFALL INTENSITY(INCH/HR) =   2.96
  TOTAL STREAM AREA(ACRES) =      4.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.74

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.64     7.21        3.537          3.04
      2       13.74     9.50        2.962          4.32

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       20.07     7.21       3.537
      2       21.81     9.50       2.962

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     21.81   Tc(MIN.) =    9.50
  TOTAL AREA(ACRES) =      7.36
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    545.00 =  1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    555.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   470.00  DOWNSTREAM(FEET) =   469.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.89
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     21.81
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   9.57
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    555.00 =  1436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    555.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.948
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    4.45   SUBAREA RUNOFF(CFS) =    9.31
  TOTAL AREA(ACRES) =     11.81   TOTAL RUNOFF(CFS) =   24.72
  TC(MIN.) =   9.57

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    525.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   469.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   201.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  17.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.38
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     24.72
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   9.97
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    525.00 =  1637.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       24.72     9.97       2.871       11.81
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    525.00 =  1637.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       18.13     7.01       3.603        7.12
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =  2218.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc     INTENSITY
  NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
      1      35.52       7.01        3.603
      2      39.17       9.97        2.871

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     39.17   Tc(MIN.) =    9.97
  TOTAL AREA(ACRES) =     18.93

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    560.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   467.00  DOWNSTREAM(FEET) =   465.30
  FLOW LENGTH(FEET) =   170.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  20.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =      9.42
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     39.17
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =  10.27
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    560.00 =  2388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    560.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.816
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6948
  SUBAREA AREA(ACRES) =    4.89   SUBAREA RUNOFF(CFS) =    9.78
```

```
  TOTAL AREA(ACRES) =     23.82   TOTAL RUNOFF(CFS) =   46.61
  TC(MIN.) =  10.27

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    570.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   465.30  DOWNSTREAM(FEET) =   464.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =12.11
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     46.61
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  10.37
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    570.00 =  2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    570.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.798
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7309
  SUBAREA AREA(ACRES) =   14.54   SUBAREA RUNOFF(CFS) =   32.14
  TOTAL AREA(ACRES) =     38.36   TOTAL RUNOFF(CFS) =   78.45
  TC(MIN.) =  10.37

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    575.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   464.00  DOWNSTREAM(FEET) =   460.00
  FLOW LENGTH(FEET) =   488.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  27.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.40
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     78.45
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =  11.15
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    575.00 =  2951.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    575.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.670
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7347
  SUBAREA AREA(ACRES) =    1.07   SUBAREA RUNOFF(CFS) =    2.49
  TOTAL AREA(ACRES) =     39.43   TOTAL RUNOFF(CFS) =   78.45
  TC(MIN.) =  11.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    580.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   460.00  DOWNSTREAM(FEET) =   458.00
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =21.11
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     78.45
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  11.18
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    580.00 =  2987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.18
  RAINFALL INTENSITY(INCH/HR) =   2.67
  TOTAL STREAM AREA(ACRES) =    39.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     78.45

****************************************************************************
  FLOW PROCESS FROM NODE    581.00 TO NODE    585.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    6.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.982
  SUBAREA RUNOFF(CFS) =     12.02
  TOTAL AREA(ACRES) =      3.82   TOTAL RUNOFF(CFS) =     12.02

****************************************************************************
  FLOW PROCESS FROM NODE    585.00 TO NODE    585.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.982
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8188
  SUBAREA AREA(ACRES) =     2.15   SUBAREA RUNOFF(CFS) =     7.45
  TOTAL AREA(ACRES) =      5.97   TOTAL RUNOFF(CFS) =   19.47
  TC(MIN.) =   6.00

****************************************************************************
  FLOW PROCESS FROM NODE    585.00 TO NODE    590.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.00  DOWNSTREAM(FEET) =   461.50
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.80
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.47
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   6.32
  LONGEST FLOWPATH FROM NODE    581.00 TO NODE    590.00 =   426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    590.00 TO NODE    580.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   461.50  DOWNSTREAM(FEET) =   458.00
  FLOW LENGTH(FEET) =    71.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =13.74
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.47
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   6.40
  LONGEST FLOWPATH FROM NODE    581.00 TO NODE    580.00 =   497.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.40
  RAINFALL INTENSITY(INCH/HR) =   3.82
  TOTAL STREAM AREA(ACRES) =     5.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       78.45    11.18        2.666         39.43
      2       19.47     6.40        3.818          5.97

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       64.41     6.40       3.818
      2       92.04    11.18       2.666

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     92.04   Tc(MIN.) =   11.18
  TOTAL AREA(ACRES) =       45.40
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    580.00 =  2987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    595.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   458.00  DOWNSTREAM(FEET) =   443.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.37
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     92.04
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =  11.68
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    595.00 =  3507.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.592
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7481
  SUBAREA AREA(ACRES) =    2.58   SUBAREA RUNOFF(CFS) =    5.28
  TOTAL AREA(ACRES) =     47.98   TOTAL RUNOFF(CFS) =   93.02
  TC(MIN.) =  11.68

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.592
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7619
  SUBAREA AREA(ACRES) =    6.12   SUBAREA RUNOFF(CFS) =   13.80
  TOTAL AREA(ACRES) =     54.10   TOTAL RUNOFF(CFS) =  106.82
  TC(MIN.) =  11.68

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.592
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7643
  SUBAREA AREA(ACRES) =    4.99   SUBAREA RUNOFF(CFS) =   10.22
  TOTAL AREA(ACRES) =     59.09   TOTAL RUNOFF(CFS) =  117.04
  TC(MIN.) =  11.68

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    600.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   443.00  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  38.48
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    117.04
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  11.73
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =  3632.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      117.04    11.73       2.584       59.09
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =  3632.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      260.09    13.02       2.416      132.38
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    600.00 =  2301.00 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc     INTENSITY
 NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
     1     351.46      11.73        2.584
     2     369.54      13.02        2.416

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    369.54   Tc(MIN.) =   13.02
 TOTAL AREA(ACRES) =      191.47

****************************************************************************
 FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.416
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7756
 SUBAREA AREA(ACRES) =    5.14   SUBAREA RUNOFF(CFS) =    9.81
 TOTAL AREA(ACRES) =    196.61   TOTAL RUNOFF(CFS) =  369.54
 TC(MIN.) =  13.02
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.416
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7758
 SUBAREA AREA(ACRES) =    3.97   SUBAREA RUNOFF(CFS) =    7.58
 TOTAL AREA(ACRES) =    200.58   TOTAL RUNOFF(CFS) =  376.02
 TC(MIN.) =  13.02

****************************************************************************
 FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.416
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7760
 SUBAREA AREA(ACRES) =    2.11   SUBAREA RUNOFF(CFS) =    4.03
 TOTAL AREA(ACRES) =    202.69   TOTAL RUNOFF(CFS) =  380.05
 TC(MIN.) =  13.02

****************************************************************************
 FLOW PROCESS FROM NODE    600.00 TO NODE    610.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   416.00  DOWNSTREAM(FEET) =   402.00
 FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.73
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    380.05
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  13.17
```

```
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    610.00 =  3912.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    620.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   402.00  DOWNSTREAM(FEET) =   366.00
  FLOW LENGTH(FEET) =   720.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  32.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =30.45
  GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    380.05
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =  13.57
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    620.00 =  4632.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.353
  *USER SPECIFIED(SUBAREA):
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7741
  SUBAREA AREA(ACRES) =   16.28   SUBAREA RUNOFF(CFS) =   28.72
  TOTAL AREA(ACRES) =    218.97   TOTAL RUNOFF(CFS) =  398.75
  TC(MIN.) =  13.57
```

Park Lot 'A' flow confluence, Q=28.72

```
****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      380.05    13.57       2.353      202.69
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    620.00 =  4632.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      243.90    21.50       1.748      177.24
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    620.00 =  6354.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc     INTENSITY
  NUMBER    (CFS)       (MIN.)   (INCH/HOUR)
      1     533.95       13.57        2.353
      2     526.30       21.50        1.748

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    533.95   Tc(MIN.) =   13.57
  TOTAL AREA(ACRES) =      379.93
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =    379.93  TC(MIN.) =     13.57
  PEAK FLOW RATE(CFS)   =    533.95
============================================================================
```

```
 ============================================================================
   END OF RATIONAL METHOD ANALYSIS
```

Total Proposed 10-Year, 6-hour flow to Wolf Canyon = 380.1 CFS
Tc = 13.6 min
Total Area = 202.6 acres

***Note: Results do not account for hydromodification measures. See the Hydromodification report for actual flows.**

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                           Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                            *
* PRELIMINARY PROPOSED HYDROLOGY                                        *
* Q25                                                                   *
 ************************************************************************

  FILE NAME: 8020P25.DAT
  TIME/DATE OF STUDY: 13:48 10/04/2010
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  25.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.800
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  22
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7670
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =   11.430
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.782
  SUBAREA RUNOFF(CFS) =    191.29
  TOTAL AREA(ACRES) =     89.64   TOTAL RUNOFF(CFS) =    191.29

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    405.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.86  DOWNSTREAM(FEET) =   429.00
```

```
  FLOW LENGTH(FEET) =   660.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  34.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.28
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    191.29
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =  12.11
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    405.00 =  1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.681
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7706
  SUBAREA AREA(ACRES) =     3.21   SUBAREA RUNOFF(CFS) =     7.49
  TOTAL AREA(ACRES) =     92.85   TOTAL RUNOFF(CFS) =  191.82
  TC(MIN.) =  12.11

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   429.00  DOWNSTREAM(FEET) =   427.50
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  33.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.92
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    191.82
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  12.20
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  1471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.20
  RAINFALL INTENSITY(INCH/HR) =   2.67
  TOTAL STREAM AREA(ACRES) =    92.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    191.82

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    415.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    7.000
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.817
  SUBAREA RUNOFF(CFS) =     57.24
  TOTAL AREA(ACRES) =     18.98   TOTAL RUNOFF(CFS) =     57.24

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    420.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   476.00  DOWNSTREAM(FEET) =   474.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =15.39
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     57.24
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   7.08
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    420.00 =   161.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    425.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   474.00  DOWNSTREAM(FEET) =   462.00
  FLOW LENGTH(FEET) =   343.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.60
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     57.24
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   7.42
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    425.00 =   504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.676
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8023
  SUBAREA AREA(ACRES) =   3.45    SUBAREA RUNOFF(CFS) =   11.03
  TOTAL AREA(ACRES) =     22.43   TOTAL RUNOFF(CFS) =   66.16
  TC(MIN.) =   7.42

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.676
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7996
  SUBAREA AREA(ACRES) =   6.36    SUBAREA RUNOFF(CFS) =   18.47
  TOTAL AREA(ACRES) =     28.79   TOTAL RUNOFF(CFS) =   84.63
  TC(MIN.) =   7.42

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.676
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7986
  SUBAREA AREA(ACRES) =    3.40   SUBAREA RUNOFF(CFS) =    9.87
  TOTAL AREA(ACRES) =     32.19   TOTAL RUNOFF(CFS) =   94.51
  TC(MIN.) =   7.42
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    426.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   462.00  DOWNSTREAM(FEET) =   456.00
  FLOW LENGTH(FEET) =   356.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  27.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.18
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     94.51
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   7.84
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    426.00 =   860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.549
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7952
  SUBAREA AREA(ACRES) =     1.26   SUBAREA RUNOFF(CFS) =     3.17
  TOTAL AREA(ACRES) =     33.45   TOTAL RUNOFF(CFS) =   94.51
  TC(MIN.) =   7.84
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.549
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7949
  SUBAREA AREA(ACRES) =     2.22   SUBAREA RUNOFF(CFS) =     6.22
  TOTAL AREA(ACRES) =     35.67   TOTAL RUNOFF(CFS) =  100.62
  TC(MIN.) =   7.84

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.549
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7980
  SUBAREA AREA(ACRES) =     1.51   SUBAREA RUNOFF(CFS) =     4.66
  TOTAL AREA(ACRES) =     37.18   TOTAL RUNOFF(CFS) =  105.28
  TC(MIN.) =   7.84

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    410.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   456.00  DOWNSTREAM(FEET) =   429.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  12.2 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  45.37
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    105.28
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   7.87
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    410.00 =   935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.87
  RAINFALL INTENSITY(INCH/HR) =   3.54
  TOTAL STREAM AREA(ACRES) =    37.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    105.28

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      191.82    12.20        2.668         92.85
      2      105.28     7.87        3.541         37.18

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      229.01     7.87       3.541
      2      271.17    12.20       2.668

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    271.17   Tc(MIN.) =   12.20
  TOTAL AREA(ACRES) =      130.03
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  1471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.668
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    2.35   SUBAREA RUNOFF(CFS) =    5.46
  TOTAL AREA(ACRES) =    132.38   TOTAL RUNOFF(CFS) =  275.54
  TC(MIN.) =  12.20

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    600.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   427.50  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =   830.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  42.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.25
  GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    275.54
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =  13.00
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    600.00 =  2301.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    505.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. POOR COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  89
  USER SPECIFIED Tc(MIN.) =    5.000
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.743
  SUBAREA RUNOFF(CFS) =      2.14
  TOTAL AREA(ACRES) =      1.29   TOTAL RUNOFF(CFS) =      2.14

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.743
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5700
  SUBAREA AREA(ACRES) =    1.29   SUBAREA RUNOFF(CFS) =    4.83
  TOTAL AREA(ACRES) =      2.58   TOTAL RUNOFF(CFS) =    6.97
  TC(MIN.) =   5.00

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   531.00  DOWNSTREAM(FEET) =   508.00
  FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.74
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.97
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   6.08
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =  1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   508.00  DOWNSTREAM(FEET) =   501.50
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.04
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.97
```

```
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   6.27
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    515.00 =  1585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    515.00 TO NODE    515.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.100
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6593
  SUBAREA AREA(ACRES) =     4.54   SUBAREA RUNOFF(CFS) =   13.21
  TOTAL AREA(ACRES) =      7.12   TOTAL RUNOFF(CFS) =   19.24
  TC(MIN.) =   6.27

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    524.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   501.50  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   219.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.70
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.24
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   6.52
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    524.00 =  1804.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    524.00 TO NODE    525.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   414.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.00
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.24
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   6.98
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =  2218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    535.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.743
  SUBAREA RUNOFF(CFS) =     10.20
  TOTAL AREA(ACRES) =      3.03   TOTAL RUNOFF(CFS) =     10.20

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    535.00 TO NODE    540.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  507.00  DOWNSTREAM ELEVATION(FEET) =  502.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =    0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =    0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.22
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   14.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   1.67   Tc(MIN.) =   6.67
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.937
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.03
  TOTAL AREA(ACRES) =      3.04        PEAK FLOW RATE(CFS) =      10.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  14.77
  FLOW VELOCITY(FEET/SEC.) =  2.99   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    540.00 =   714.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    540.00 TO NODE    545.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   497.00  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   412.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.63
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.20
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   7.18
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    545.00 =  1126.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    545.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.18
  RAINFALL INTENSITY(INCH/HR) =   3.76
  TOTAL STREAM AREA(ACRES) =     3.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.20

****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    550.00 IS CODE =  22
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.743
  SUBAREA RUNOFF(CFS) =     14.55
  TOTAL AREA(ACRES) =      4.32   TOTAL RUNOFF(CFS) =     14.55

****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    551.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  493.00  DOWNSTREAM ELEVATION(FEET) =  478.50
  STREET LENGTH(FEET) =   740.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   17.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.36
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   3.67   Tc(MIN.) =   8.67
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.326
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.00      SUBAREA RUNOFF(CFS) =    0.00
  TOTAL AREA(ACRES) =      4.32        PEAK FLOW RATE(CFS) =      14.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  17.58
  FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    551.00 =  1040.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    551.00 TO NODE    545.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   473.50  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =      7.34
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.55
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   9.46
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    545.00 =  1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    545.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.46
  RAINFALL INTENSITY(INCH/HR) =    3.14
  TOTAL STREAM AREA(ACRES) =       4.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.55

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY       AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)     (ACRE)
      1       10.20      7.18         3.757          3.04
      2       14.55      9.46         3.143          4.32

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
      1       21.23      7.18        3.757
      2       23.08      9.46        3.143

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     23.08   Tc(MIN.) =    9.46
  TOTAL AREA(ACRES) =      7.36
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    545.00 =  1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    555.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   470.00  DOWNSTREAM(FEET) =   469.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.05
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.08
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   9.53
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    555.00 =  1436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    555.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.128
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    4.45   SUBAREA RUNOFF(CFS) =    9.88
  TOTAL AREA(ACRES) =     11.81   TOTAL RUNOFF(CFS) =   26.23
  TC(MIN.) =   9.53

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    525.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   469.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   201.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.49
```

```
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     26.23
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   9.93
 LONGEST FLOWPATH FROM NODE    550.00 TO NODE    525.00 =  1637.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF     Tc      INTENSITY     AREA
 NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       26.23     9.93       3.047       11.81
 LONGEST FLOWPATH FROM NODE    550.00 TO NODE    525.00 =  1637.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF     Tc      INTENSITY     AREA
 NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       19.24     6.98       3.826        7.12
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =  2218.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc     INTENSITY
 NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
     1      37.67       6.98        3.826
     2      41.55       9.93        3.047

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     41.55   Tc(MIN.) =    9.93
 TOTAL AREA(ACRES) =     18.93

****************************************************************************
 FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    525.00 TO NODE    560.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   467.00  DOWNSTREAM(FEET) =   465.30
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  21.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =      9.55
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     41.55
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =  10.22
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    560.00 =  2388.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    560.00 TO NODE    560.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.990
 RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6948
 SUBAREA AREA(ACRES) =    4.89   SUBAREA RUNOFF(CFS) =   10.38
 TOTAL AREA(ACRES) =     23.82   TOTAL RUNOFF(CFS) =   49.49
 TC(MIN.) =  10.22
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    570.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   465.30  DOWNSTREAM(FEET) =   464.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =12.29
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     49.49
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  10.33
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    570.00 =  2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    570.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.971
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7309
  SUBAREA AREA(ACRES) =   14.54   SUBAREA RUNOFF(CFS) =   34.12
  TOTAL AREA(ACRES) =     38.36   TOTAL RUNOFF(CFS) =   83.30
  TC(MIN.) =  10.33

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    575.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   464.00  DOWNSTREAM(FEET) =   460.00
  FLOW LENGTH(FEET) =   488.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  28.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.54
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     83.30
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =  11.10
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    575.00 =  2951.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    575.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.836
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7347
  SUBAREA AREA(ACRES) =    1.07   SUBAREA RUNOFF(CFS) =    2.64
  TOTAL AREA(ACRES) =     39.43   TOTAL RUNOFF(CFS) =   83.30
  TC(MIN.) =  11.10
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    580.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   460.00  DOWNSTREAM(FEET) =   458.00
```

```
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =21.46
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     83.30
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  11.12
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    580.00 =  2987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.12
  RAINFALL INTENSITY(INCH/HR) =   2.83
  TOTAL STREAM AREA(ACRES) =    39.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     83.30

****************************************************************************
  FLOW PROCESS FROM NODE    581.00 TO NODE    585.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    6.000
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.216
  SUBAREA RUNOFF(CFS) =     12.72
  TOTAL AREA(ACRES) =      3.82   TOTAL RUNOFF(CFS) =     12.72

****************************************************************************
  FLOW PROCESS FROM NODE    585.00 TO NODE    585.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.216
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8188
  SUBAREA AREA(ACRES) =     2.15   SUBAREA RUNOFF(CFS) =     7.89
  TOTAL AREA(ACRES) =      5.97   TOTAL RUNOFF(CFS) =   20.61
  TC(MIN.) =   6.00

****************************************************************************
  FLOW PROCESS FROM NODE    585.00 TO NODE    590.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.00  DOWNSTREAM(FEET) =   461.50
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.96
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.61
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   6.31
  LONGEST FLOWPATH FROM NODE    581.00 TO NODE    590.00 =   426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    590.00 TO NODE    580.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   461.50  DOWNSTREAM(FEET) =   458.00
  FLOW LENGTH(FEET) =    71.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS   8.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =13.97
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.61
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   6.40
  LONGEST FLOWPATH FROM NODE    581.00 TO NODE    580.00 =   497.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.40
  RAINFALL INTENSITY(INCH/HR) =   4.05
  TOTAL STREAM AREA(ACRES) =     5.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       83.30    11.12        2.831         39.43
      2       20.61     6.40        4.045          5.97

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       68.52     6.40       4.045
      2       97.72    11.12       2.831

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     97.72   Tc(MIN.) =   11.12
  TOTAL AREA(ACRES) =       45.40
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    580.00 =  2987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    595.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   458.00  DOWNSTREAM(FEET) =   443.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  21.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.64
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     97.72
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =  11.62
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    595.00 =  3507.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.753
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7481
  SUBAREA AREA(ACRES) =     2.58   SUBAREA RUNOFF(CFS) =     5.61
  TOTAL AREA(ACRES) =     47.98   TOTAL RUNOFF(CFS) =   98.84
  TC(MIN.) =  11.62

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.753
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7619
  SUBAREA AREA(ACRES) =     6.12   SUBAREA RUNOFF(CFS) =   14.66
  TOTAL AREA(ACRES) =     54.10   TOTAL RUNOFF(CFS) =  113.50
  TC(MIN.) =  11.62

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.753
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7643
  SUBAREA AREA(ACRES) =     4.99   SUBAREA RUNOFF(CFS) =   10.85
  TOTAL AREA(ACRES) =     59.09   TOTAL RUNOFF(CFS) =  124.35
  TC(MIN.) =  11.62

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    600.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   443.00  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.14
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    124.35
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  11.67
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =  3632.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      124.35    11.67       2.745       59.09
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =  3632.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      275.54    13.00       2.561      132.38
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    600.00 =  2301.00 FEET.

  ** PEAK FLOW RATE TABLE **
```

```
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     371.74      11.67        2.745
      2     391.54      13.00        2.561

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    391.54   Tc(MIN.) =   13.00
  TOTAL AREA(ACRES) =      191.47

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.561
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7756
  SUBAREA AREA(ACRES) =    5.14   SUBAREA RUNOFF(CFS) =   10.40
  TOTAL AREA(ACRES) =    196.61   TOTAL RUNOFF(CFS) =  391.54
  TC(MIN.) =  13.00
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.561
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7758
  SUBAREA AREA(ACRES) =    3.97   SUBAREA RUNOFF(CFS) =    8.03
  TOTAL AREA(ACRES) =    200.58   TOTAL RUNOFF(CFS) =  398.54
  TC(MIN.) =  13.00

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.561
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7760
  SUBAREA AREA(ACRES) =    2.11   SUBAREA RUNOFF(CFS) =    4.27
  TOTAL AREA(ACRES) =    202.69   TOTAL RUNOFF(CFS) =  402.81
  TC(MIN.) =  13.00

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    610.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   416.00  DOWNSTREAM(FEET) =   402.00
  FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.88
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    402.81
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  13.15
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    610.00 =  3912.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    620.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   402.00  DOWNSTREAM(FEET) =   366.00
  FLOW LENGTH(FEET) =   720.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  33.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =30.91
  GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    402.81
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =  13.54
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    620.00 =  4632.00 FEET.


****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.494
  *USER SPECIFIED(SUBAREA):
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7741
  SUBAREA AREA(ACRES) =   16.28   SUBAREA RUNOFF(CFS) =   30.45
  TOTAL AREA(ACRES) =    218.97   TOTAL RUNOFF(CFS) =  422.74
  TC(MIN.) =  13.54
```

Park Lot 'A' flow confluence, Q=30.45

```
****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      402.81    13.54       2.494      202.69
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    620.00 =  4632.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      258.69    21.43       1.855      177.24
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    620.00 =  6354.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc     INTENSITY
  NUMBER    (CFS)       (MIN.)   (INCH/HOUR)
      1     566.30       13.54        2.494
      2     558.31       21.43        1.855

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    566.30   Tc(MIN.) =   13.54
  TOTAL AREA(ACRES) =      379.93
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =    379.93  TC(MIN.) =     13.54
  PEAK FLOW RATE(CFS)   =    566.30
============================================================================
```

```
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Total Proposed 25-Year, 6-hour flow to Wolf Canyon = 402.8 CFS
Tc = 13.5 min
Total Area = 202.6 acres

***Note: Results do not account for hydromodification measures. See the Hydromodification report for actual flows.**

```
 ************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                           Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                            *
* PRELIMINARY PROPOSED HYDROLOGY                                        *
* Q50                                                                   *
 ************************************************************************

  FILE NAME: 8020P50.DAT
  TIME/DATE OF STUDY: 13:34 10/04/2010
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7670
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =   11.430
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.401
  SUBAREA RUNOFF(CFS) =    233.80
  TOTAL AREA(ACRES) =     89.64   TOTAL RUNOFF(CFS) =    233.80

************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    405.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.86  DOWNSTREAM(FEET) =   429.00
  FLOW LENGTH(FEET) =   660.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  39.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.98
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    233.80
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =  12.08
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    405.00 =   660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.282
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7706
  SUBAREA AREA(ACRES) =    3.21   SUBAREA RUNOFF(CFS) =    9.17
  TOTAL AREA(ACRES) =     92.85   TOTAL RUNOFF(CFS) =  234.80
  TC(MIN.) =  12.08

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   429.00  DOWNSTREAM(FEET) =   427.50
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  38.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.68
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    234.80
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  12.16
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =   751.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.16
  RAINFALL INTENSITY(INCH/HR) =   3.27
  TOTAL STREAM AREA(ACRES) =    92.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    234.80

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    415.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    7.000
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.666
  SUBAREA RUNOFF(CFS) =     69.96
  TOTAL AREA(ACRES) =     18.98   TOTAL RUNOFF(CFS) =     69.96

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    420.00 IS CODE =  41
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   476.00  DOWNSTREAM(FEET) =   474.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  21.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.13
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     69.96
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   7.07
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    420.00 =   161.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    425.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   474.00  DOWNSTREAM(FEET) =   462.00
  FLOW LENGTH(FEET) =   343.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =17.44
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     69.96
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   7.40
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    425.00 =   504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.501
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8023
  SUBAREA AREA(ACRES) =   3.45    SUBAREA RUNOFF(CFS) =   13.51
  TOTAL AREA(ACRES) =     22.43   TOTAL RUNOFF(CFS) =   81.00
  TC(MIN.) =   7.40

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.501
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7996
  SUBAREA AREA(ACRES) =   6.36    SUBAREA RUNOFF(CFS) =22.62
  TOTAL AREA(ACRES) =     28.79   TOTAL RUNOFF(CFS) =  103.62
  TC(MIN.) =   7.40

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.501
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7986
  SUBAREA AREA(ACRES) =    3.40   SUBAREA RUNOFF(CFS) =   12.09
```

```
  TOTAL AREA(ACRES) =     32.19   TOTAL RUNOFF(CFS) =  115.71
  TC(MIN.) =   7.40

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    426.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   462.00  DOWNSTREAM(FEET) =   456.00
  FLOW LENGTH(FEET) =   356.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.63
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    115.71
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   7.81
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    426.00 =   860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.349
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7952
  SUBAREA AREA(ACRES) =     1.26   SUBAREA RUNOFF(CFS) =    3.89
  TOTAL AREA(ACRES) =     33.45   TOTAL RUNOFF(CFS) =  115.71
  TC(MIN.) =   7.81
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.349
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7949
  SUBAREA AREA(ACRES) =     2.22   SUBAREA RUNOFF(CFS) =    7.63
  TOTAL AREA(ACRES) =     35.67   TOTAL RUNOFF(CFS) =  123.32
  TC(MIN.) =   7.81

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.349
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7980
  SUBAREA AREA(ACRES) =     1.51   SUBAREA RUNOFF(CFS) =    5.71
  TOTAL AREA(ACRES) =     37.18   TOTAL RUNOFF(CFS) =  129.03
  TC(MIN.) =   7.81

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    410.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   456.00  DOWNSTREAM(FEET) =   429.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  48.06
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    129.03
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   7.83
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    410.00 =   935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.83
  RAINFALL INTENSITY(INCH/HR) =   4.34
  TOTAL STREAM AREA(ACRES) =    37.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    129.03

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      234.80    12.16        3.267         92.85
      2      129.03     7.83        4.340         37.18

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      280.21     7.83       4.340
      2      331.93    12.16       3.267

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    331.93   Tc(MIN.) =   12.16
  TOTAL AREA(ACRES) =    130.03
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    410.00 =   935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.267
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    2.35   SUBAREA RUNOFF(CFS) =    6.68
  TOTAL AREA(ACRES) =    132.38   TOTAL RUNOFF(CFS) =  337.34
  TC(MIN.) =  12.16

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    600.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   427.50  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =   830.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.86
  GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =    337.34
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =  12.94
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    600.00 =  1765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    505.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. POOR COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  89
  USER SPECIFIED Tc(MIN.) =    5.000
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.796
  SUBAREA RUNOFF(CFS) =      2.62
  TOTAL AREA(ACRES) =      1.29   TOTAL RUNOFF(CFS) =      2.62

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.796
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5700
  SUBAREA AREA(ACRES) =    1.29   SUBAREA RUNOFF(CFS) =    5.91
  TOTAL AREA(ACRES) =      2.58   TOTAL RUNOFF(CFS) =    8.52
  TC(MIN.) =   5.00

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   531.00  DOWNSTREAM(FEET) =   508.00
  FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.30
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.52
  PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =   6.02
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =  1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   508.00  DOWNSTREAM(FEET) =   501.50
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.8 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.70
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.52
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   6.20
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    515.00 =  1585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    515.00 TO NODE    515.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.047
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6593
  SUBAREA AREA(ACRES) =     4.54   SUBAREA RUNOFF(CFS) =   16.27
  TOTAL AREA(ACRES) =      7.12   TOTAL RUNOFF(CFS) =   23.69
  TC(MIN.) =   6.20

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    524.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   501.50  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   219.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.51
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.69
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   6.43
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    524.00 =  1804.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    524.00 TO NODE    525.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   414.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.84
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.69
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   6.87
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =  2218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    535.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.796
  SUBAREA RUNOFF(CFS) =     12.47
```

```
  TOTAL AREA(ACRES) =      3.03   TOTAL RUNOFF(CFS) =     12.47

****************************************************************************
  FLOW PROCESS FROM NODE    535.00 TO NODE    540.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  507.00  DOWNSTREAM ELEVATION(FEET) =  502.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.49
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   16.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.21
  STREET FLOW TRAVEL TIME(MIN.) =   1.62   Tc(MIN.) =   6.62
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.834
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.03
  TOTAL AREA(ACRES) =      3.04        PEAK FLOW RATE(CFS) =      12.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  16.80
  FLOW VELOCITY(FEET/SEC.) =  3.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    540.00 =   714.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    540.00 TO NODE    545.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   497.00  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   412.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.35
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.47
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   7.10
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    545.00 =  1126.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    545.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.10
  RAINFALL INTENSITY(INCH/HR) =   4.62
  TOTAL STREAM AREA(ACRES) =     3.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.47
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    550.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.796
  SUBAREA RUNOFF(CFS) =     17.78
  TOTAL AREA(ACRES) =      4.32   TOTAL RUNOFF(CFS) =     17.78

****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    551.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  493.00  DOWNSTREAM ELEVATION(FEET) =  478.50
  STREET LENGTH(FEET) =   740.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.78
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   19.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.50
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.48
  STREET FLOW TRAVEL TIME(MIN.) =   3.53   Tc(MIN.) =   8.53
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.109
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.00      SUBAREA RUNOFF(CFS) =    0.00
  TOTAL AREA(ACRES) =      4.32        PEAK FLOW RATE(CFS) =      17.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  19.61
  FLOW VELOCITY(FEET/SEC.) =  3.50   DEPTH*VELOCITY(FT*FT/SEC.) =   1.48
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    551.00 =  1040.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    551.00 TO NODE    545.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   473.50  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =      7.64
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     17.78
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   9.29
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    545.00 =  1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    545.00 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.29
  RAINFALL INTENSITY(INCH/HR) =   3.89
  TOTAL STREAM AREA(ACRES) =     4.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.78

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       12.47     7.10        4.622          3.04
      2       17.78     9.29        3.887          4.32

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       26.06     7.10       4.622
      2       28.27     9.29       3.887

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     28.27   Tc(MIN.) =    9.29
  TOTAL AREA(ACRES) =      7.36
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    545.00 =  1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    555.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   470.00  DOWNSTREAM(FEET) =   469.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.64
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     28.27
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   9.36
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    555.00 =  1436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    555.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.870
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    4.45   SUBAREA RUNOFF(CFS) =   12.23
  TOTAL AREA(ACRES) =     11.81   TOTAL RUNOFF(CFS) =   32.45
  TC(MIN.) =   9.36

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    525.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   469.00  DOWNSTREAM(FEET) =   467.00
```

```
  FLOW LENGTH(FEET) =   201.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =8.85
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     32.45
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   9.73
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    525.00 =  1637.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       32.45     9.73        3.772       11.81
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    525.00 =  1637.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       23.69     6.87        4.723        7.12
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =  2218.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc     INTENSITY
  NUMBER    (CFS)       (MIN.)   (INCH/HOUR)
      1      46.59        6.87        4.723
      2      51.37        9.73        3.772

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     51.37   Tc(MIN.) =    9.73
  TOTAL AREA(ACRES) =     18.93

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    560.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   467.00  DOWNSTREAM(FEET) =   465.30
  FLOW LENGTH(FEET) =   170.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =      9.97
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     51.37
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =  10.02
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    560.00 =  2388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    560.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.703
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6948
```

```
  SUBAREA AREA(ACRES) =    4.89   SUBAREA RUNOFF(CFS) =   12.85
  TOTAL AREA(ACRES) =     23.82   TOTAL RUNOFF(CFS) =   61.28
  TC(MIN.) =  10.02

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    570.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   465.30  DOWNSTREAM(FEET) =   464.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =12.88
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     61.28
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  10.11
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    570.00 =  2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    570.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.680
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7309
  SUBAREA AREA(ACRES) =   14.54   SUBAREA RUNOFF(CFS) =   42.27
  TOTAL AREA(ACRES) =     38.36   TOTAL RUNOFF(CFS) =  103.17
  TC(MIN.) =  10.11

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    575.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   464.00  DOWNSTREAM(FEET) =   460.00
  FLOW LENGTH(FEET) =   488.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  33.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.99
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    103.17
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =  10.85
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    575.00 =  2951.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    575.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.516
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7347
  SUBAREA AREA(ACRES) =    1.07   SUBAREA RUNOFF(CFS) =    3.27
  TOTAL AREA(ACRES) =     39.43   TOTAL RUNOFF(CFS) =  103.17
  TC(MIN.) =  10.85
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    580.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   460.00  DOWNSTREAM(FEET) =   458.00
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =22.76
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    103.17
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  10.88
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    580.00 =  2987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.88
  RAINFALL INTENSITY(INCH/HR) =   3.51
  TOTAL STREAM AREA(ACRES) =    39.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    103.17

****************************************************************************
  FLOW PROCESS FROM NODE    581.00 TO NODE    585.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    6.000
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.153
  SUBAREA RUNOFF(CFS) =     15.55
  TOTAL AREA(ACRES) =      3.82   TOTAL RUNOFF(CFS) =     15.55

****************************************************************************
  FLOW PROCESS FROM NODE    585.00 TO NODE    585.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.153
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8188
  SUBAREA AREA(ACRES) =    2.15   SUBAREA RUNOFF(CFS) =    9.64
  TOTAL AREA(ACRES) =      5.97   TOTAL RUNOFF(CFS) =   25.19
  TC(MIN.) =   6.00

****************************************************************************
  FLOW PROCESS FROM NODE    585.00 TO NODE    590.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.00  DOWNSTREAM(FEET) =   461.50
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.53
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     25.19
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   6.30
  LONGEST FLOWPATH FROM NODE    581.00 TO NODE    590.00 =   426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    590.00 TO NODE    580.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   461.50  DOWNSTREAM(FEET) =   458.00
  FLOW LENGTH(FEET) =    71.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.81
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     25.19
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   6.38
  LONGEST FLOWPATH FROM NODE    581.00 TO NODE    580.00 =   497.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.38
  RAINFALL INTENSITY(INCH/HR) =   4.95
  TOTAL STREAM AREA(ACRES) =     5.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     25.19

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      103.17    10.88        3.510         39.43
      2       25.19     6.38        4.954          5.97

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       85.68     6.38       4.954
      2      121.02    10.88       3.510

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    121.02   Tc(MIN.) =   10.88
  TOTAL AREA(ACRES) =      45.40
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    580.00 =  2987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    595.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   458.00  DOWNSTREAM(FEET) =   443.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.62
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    121.02
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =  11.35
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    595.00 =  3507.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.417
```

```
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7481
  SUBAREA AREA(ACRES) =    2.58   SUBAREA RUNOFF(CFS) =    6.96
  TOTAL AREA(ACRES) =     47.98   TOTAL RUNOFF(CFS) =  122.64
  TC(MIN.) =  11.35

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.417
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7619
  SUBAREA AREA(ACRES) =    6.12   SUBAREA RUNOFF(CFS) =   18.19
  TOTAL AREA(ACRES) =     54.10   TOTAL RUNOFF(CFS) =  140.84
  TC(MIN.) =  11.35

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.417
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7643
  SUBAREA AREA(ACRES) =    4.99   SUBAREA RUNOFF(CFS) =   13.47
  TOTAL AREA(ACRES) =     59.09   TOTAL RUNOFF(CFS) =  154.31
  TC(MIN.) =  11.35

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    600.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   443.00  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  41.59
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    154.31
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  11.40
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =  3632.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      154.31    11.40       3.407       59.09
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =  3632.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      337.34    12.94       3.139      132.38
```

```
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    600.00 =  1765.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc     INTENSITY
  NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
      1     451.45      11.40        3.407
      2     479.52      12.94        3.139

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    479.52   Tc(MIN.) =   12.94
  TOTAL AREA(ACRES) =      191.47

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.139
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7756
  SUBAREA AREA(ACRES) =    5.14   SUBAREA RUNOFF(CFS) =   12.75
  TOTAL AREA(ACRES) =    196.61   TOTAL RUNOFF(CFS) =  479.52
  TC(MIN.) =  12.94
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.139
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7758
  SUBAREA AREA(ACRES) =    3.97   SUBAREA RUNOFF(CFS) =    9.85
  TOTAL AREA(ACRES) =    200.58   TOTAL RUNOFF(CFS) =  488.54
  TC(MIN.) =  12.94

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.139
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7760
  SUBAREA AREA(ACRES) =    2.11   SUBAREA RUNOFF(CFS) =    5.23
  TOTAL AREA(ACRES) =    202.69   TOTAL RUNOFF(CFS) =  493.77
  TC(MIN.) =  12.94

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    610.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   416.00  DOWNSTREAM(FEET) =   402.00
  FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.81
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    493.77
```

```
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  13.08
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    610.00 =  3912.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    620.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   402.00  DOWNSTREAM(FEET) =   366.00
  FLOW LENGTH(FEET) =   720.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  38.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =32.52
  GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    493.77
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =  13.45
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    620.00 =  4632.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.061
  *USER SPECIFIED(SUBAREA):
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7741
  SUBAREA AREA(ACRES) =   16.28   SUBAREA RUNOFF(CFS) =   37.38
  TOTAL AREA(ACRES) =    218.97   TOTAL RUNOFF(CFS) =  518.86
  TC(MIN.) =  13.45
```

Park 'A' flow confluence, Q=37.38

```
****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      493.77    13.45       3.061      202.69
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    620.00 =  4632.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      317.97    21.18       2.285      177.24
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    620.00 =  6354.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc     INTENSITY
  NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
      1     695.79      13.45        3.061
      2     686.50      21.18        2.285

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    695.79   Tc(MIN.) =   13.45
  TOTAL AREA(ACRES) =      379.93
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =    379.93  TC(MIN.) =     13.45
```

```
  PEAK FLOW RATE(CFS)   =    695.79
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Total Proposed 50-Year, 6-hour flow to Wolf Canyon = 493.8 CFS
Tc = 13.5 min
Total Area = 202.6 acres

***Note: Results do not account for hydromodification measures. See the Hydromodification report for actual flows.**

```
 ************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                            *
* PRELIMINARY PROPOSED HYDROLOGY                                        *
* Q100                                                                  *
 ************************************************************************

  FILE NAME: 8020P100.DAT
  TIME/DATE OF STUDY: 12:50 10/04/2010
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
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  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*



****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    405.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.86  DOWNSTREAM(FEET) =   429.00
  FLOW LENGTH(FEET) =   660.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =17.35
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    265.69
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =  12.06
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    405.00 =  2160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
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```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.732
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7706
  SUBAREA AREA(ACRES) =   3.21    SUBAREA RUNOFF(CFS) =10.42
  TOTAL AREA(ACRES) =     92.85   TOTAL RUNOFF(CFS) =  267.02
  TC(MIN.) =  12.06

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   429.00  DOWNSTREAM(FEET) =   427.50
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  42.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =18.11
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    267.02
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  12.15
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  2251.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.15
  RAINFALL INTENSITY(INCH/HR) =   3.72
  TOTAL STREAM AREA(ACRES) =    92.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    267.02

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    415.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    7.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.302
  SUBAREA RUNOFF(CFS) =     79.50
  TOTAL AREA(ACRES) =     18.98   TOTAL RUNOFF(CFS) =     79.50

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    420.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   476.00  DOWNSTREAM(FEET) =   474.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  23.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.58
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     79.50
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   7.07
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    420.00 =   161.00 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    420.00 TO NODE    425.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   474.00  DOWNSTREAM(FEET) =   462.00
  FLOW LENGTH(FEET) =   343.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  21.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =17.95
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     79.50
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   7.39
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    425.00 =   504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.120
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8023
  SUBAREA AREA(ACRES) =   3.45    SUBAREA RUNOFF(CFS) =   15.37
  TOTAL AREA(ACRES) =     22.43   TOTAL RUNOFF(CFS) =   92.14
  TC(MIN.) =   7.39

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.120
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7996
  SUBAREA AREA(ACRES) =   6.36    SUBAREA RUNOFF(CFS) =25.73
  TOTAL AREA(ACRES) =     28.79   TOTAL RUNOFF(CFS) =  117.87
  TC(MIN.) =   7.39

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.120
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7986
  SUBAREA AREA(ACRES) =   3.40    SUBAREA RUNOFF(CFS) =13.75
  TOTAL AREA(ACRES) =     32.19   TOTAL RUNOFF(CFS) =  131.62
  TC(MIN.) =   7.39

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    426.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   462.00  DOWNSTREAM(FEET) =   456.00
  FLOW LENGTH(FEET) =   356.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.68
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
```

```
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    131.62
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   7.82
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    426.00 =   860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.935
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7952
  SUBAREA AREA(ACRES) =    1.26   SUBAREA RUNOFF(CFS) =    4.42
  TOTAL AREA(ACRES) =     33.45   TOTAL RUNOFF(CFS) =  131.62
  TC(MIN.) =   7.82
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.935
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7949
  SUBAREA AREA(ACRES) =    2.22   SUBAREA RUNOFF(CFS) =    8.66
  TOTAL AREA(ACRES) =     35.67   TOTAL RUNOFF(CFS) =  139.94
  TC(MIN.) =   7.82

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    426.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.935
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7980
  SUBAREA AREA(ACRES) =    1.51   SUBAREA RUNOFF(CFS) =    6.48
  TOTAL AREA(ACRES) =     37.18   TOTAL RUNOFF(CFS) =  146.42
  TC(MIN.) =   7.82

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    410.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   456.00  DOWNSTREAM(FEET) =   429.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  14.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  49.79
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    146.42
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   7.85
  LONGEST FLOWPATH FROM NODE    415.00 TO NODE    410.00 =   935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.85
  RAINFALL INTENSITY(INCH/HR) =   4.93
  TOTAL STREAM AREA(ACRES) =
  37.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    146.42

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      267.02    12.15        3.715         92.85
      2      146.42     7.85        4.925         37.18

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      318.92     7.85       4.925
      2      377.48    12.15       3.715

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    377.48   Tc(MIN.) =   12.15
  TOTAL AREA(ACRES) =    130.03
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =  2251.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.715
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    2.35   SUBAREA RUNOFF(CFS) =    7.60
  TOTAL AREA(ACRES) =    132.38   TOTAL RUNOFF(CFS) =  383.66
  TC(MIN.) =  12.15

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    600.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   427.50  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =   830.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.15
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    383.66
  PIPE TRAVEL TIME(MIN.) =   0.86    Tc(MIN.) =  13.00
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    600.00 =  3081.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  10
```

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----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    505.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LAWNS, GOLF COURSES, ETC. POOR COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  89
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.587
  SUBAREA RUNOFF(CFS) =      2.97
  TOTAL AREA(ACRES) =      1.29   TOTAL RUNOFF(CFS) =      2.97

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.587
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5700
  SUBAREA AREA(ACRES) =    1.29   SUBAREA RUNOFF(CFS) =    6.71
  TOTAL AREA(ACRES) =      2.58   TOTAL RUNOFF(CFS) =    9.69
  TC(MIN.) =   5.00

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   531.00  DOWNSTREAM(FEET) =   508.00
  FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.68
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.69
  PIPE TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =   5.98
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =  1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   508.00  DOWNSTREAM(FEET) =   501.50
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.13
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.69
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   6.16
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    515.00 =  1585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    515.00 TO NODE    515.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.760
```

```
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6593
  SUBAREA AREA(ACRES) =     4.54   SUBAREA RUNOFF(CFS) =   18.57
  TOTAL AREA(ACRES) =      7.12   TOTAL RUNOFF(CFS) =   27.04
  TC(MIN.) =   6.16

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    524.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   501.50  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   219.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.02
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     27.04
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   6.38
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    524.00 =  1804.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    524.00 TO NODE    525.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   414.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.37
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     27.04
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   6.80
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =  2218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    535.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.587
  SUBAREA RUNOFF(CFS) =     14.17
  TOTAL AREA(ACRES) =      3.03   TOTAL RUNOFF(CFS) =     14.17

****************************************************************************
  FLOW PROCESS FROM NODE    535.00 TO NODE    540.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  507.00  DOWNSTREAM ELEVATION(FEET) =  502.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   18.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.16
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.28
  STREET FLOW TRAVEL TIME(MIN.) =   1.58   Tc(MIN.) =   6.58
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.516
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.04
  TOTAL AREA(ACRES) =      3.04        PEAK FLOW RATE(CFS) =      14.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  18.05
  FLOW VELOCITY(FEET/SEC.) =  3.15   DEPTH*VELOCITY(FT*FT/SEC.) =   1.28
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    540.00 =   714.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    540.00 TO NODE    545.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   497.00  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   412.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.81
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.17
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   7.05
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    545.00 =  1126.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    545.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.05
  RAINFALL INTENSITY(INCH/HR) =   5.28
  TOTAL STREAM AREA(ACRES) =     3.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.17

****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    550.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.587
  SUBAREA RUNOFF(CFS) =     20.20
```

```
 TOTAL AREA(ACRES) =      4.32   TOTAL RUNOFF(CFS) =     20.20

****************************************************************************
 FLOW PROCESS FROM NODE    550.00 TO NODE    551.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  493.00  DOWNSTREAM ELEVATION(FEET) =  478.50
 STREET LENGTH(FEET) =   740.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 50.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.010
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.20
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.44
   HALFSTREET FLOOD WIDTH(FEET) =   21.02
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.57
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.56
 STREET FLOW TRAVEL TIME(MIN.) =   3.45   Tc(MIN.) =   8.45
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.695
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
 SUBAREA AREA(ACRES) =    0.00      SUBAREA RUNOFF(CFS) =    0.00
 TOTAL AREA(ACRES) =      4.32        PEAK FLOW RATE(CFS) =      20.20

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  21.02
 FLOW VELOCITY(FEET/SEC.) =  3.57   DEPTH*VELOCITY(FT*FT/SEC.) =   1.56
 LONGEST FLOWPATH FROM NODE    550.00 TO NODE    551.00 =  1040.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    551.00 TO NODE    545.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   473.50  DOWNSTREAM(FEET) =   470.00
 FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =      7.77
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     20.20
 PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =   9.20
 LONGEST FLOWPATH FROM NODE    550.00 TO NODE    545.00 =  1390.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    545.00 TO NODE    545.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.20
 RAINFALL INTENSITY(INCH/HR) =   4.44
 TOTAL STREAM AREA(ACRES) =     4.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.20

 ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       14.17     7.05        5.279          3.04
      2       20.20     9.20        4.444          4.32

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       29.64     7.05       5.279
      2       32.13     9.20       4.444

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     32.13   Tc(MIN.) =    9.20
  TOTAL AREA(ACRES) =      7.36
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    545.00 =  1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    555.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   470.00  DOWNSTREAM(FEET) =   469.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.02
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     32.13
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   9.27
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    555.00 =  1436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    555.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.425
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    4.45   SUBAREA RUNOFF(CFS) =   13.98
  TOTAL AREA(ACRES) =     11.81   TOTAL RUNOFF(CFS) =   37.10
  TC(MIN.) =   9.27

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    525.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   469.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   201.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.00
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     37.10
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   9.64
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    525.00 =  1637.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
```

```
==========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       37.10     9.64        4.314       11.81
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    525.00 =  1637.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       27.04     6.80        5.400        7.12
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =  2218.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc     INTENSITY
  NUMBER    (CFS)       (MIN.)   (INCH/HOUR)
      1      53.23        6.80        5.400
      2      58.70        9.64        4.314

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     58.70   Tc(MIN.) =    9.64
  TOTAL AREA(ACRES) =     18.93

**************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  12
--------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    560.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   467.00  DOWNSTREAM(FEET) =   465.30
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.17
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     58.70
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   9.92
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    560.00 =  2388.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    560.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.235
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6948
  SUBAREA AREA(ACRES) =    4.89   SUBAREA RUNOFF(CFS) =   14.70
  TOTAL AREA(ACRES) =     23.82   TOTAL RUNOFF(CFS) =   70.09
  TC(MIN.) =   9.92

**************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    570.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   465.30  DOWNSTREAM(FEET) =   464.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.21
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     70.09
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  10.01
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    570.00 =  2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    570.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.209
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7309
  SUBAREA AREA(ACRES) =   14.54   SUBAREA RUNOFF(CFS) =   48.35
  TOTAL AREA(ACRES) =     38.36   TOTAL RUNOFF(CFS) =  118.02
  TC(MIN.) =  10.01

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    575.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   464.00  DOWNSTREAM(FEET) =   460.00
  FLOW LENGTH(FEET) =   488.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  37.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.18
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    118.02
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =  10.74
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    575.00 =  2951.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    575.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.023
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7347
  SUBAREA AREA(ACRES) =    1.07   SUBAREA RUNOFF(CFS) =    3.74
  TOTAL AREA(ACRES) =     39.43   TOTAL RUNOFF(CFS) =  118.02
  TC(MIN.) =  10.74
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    580.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   460.00  DOWNSTREAM(FEET) =   458.00
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  20.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.60
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    118.02
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  10.76
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    580.00 =  2987.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.76
 RAINFALL INTENSITY(INCH/HR) =   4.02
 TOTAL STREAM AREA(ACRES) =    39.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    118.02

****************************************************************************
 FLOW PROCESS FROM NODE    581.00 TO NODE    585.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 USER SPECIFIED Tc(MIN.) =    6.000
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.856
 SUBAREA RUNOFF(CFS) =     17.67
 TOTAL AREA(ACRES) =      3.82   TOTAL RUNOFF(CFS) =     17.67

****************************************************************************
 FLOW PROCESS FROM NODE    585.00 TO NODE    585.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.856
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8188
 SUBAREA AREA(ACRES) =     2.15   SUBAREA RUNOFF(CFS) =   10.95
 TOTAL AREA(ACRES) =      5.97   TOTAL RUNOFF(CFS) =   28.63
 TC(MIN.) =   6.00

****************************************************************************
 FLOW PROCESS FROM NODE    585.00 TO NODE    590.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   468.00  DOWNSTREAM(FEET) =   461.50
 FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =12.86
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     28.63
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   6.29
 LONGEST FLOWPATH FROM NODE    581.00 TO NODE    590.00 =   426.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    590.00 TO NODE    580.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   461.50  DOWNSTREAM(FEET) =   458.00
 FLOW LENGTH(FEET) =    71.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  10.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =15.37
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     28.63
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   6.37
 LONGEST FLOWPATH FROM NODE    581.00 TO NODE    580.00 =   497.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.37
  RAINFALL INTENSITY(INCH/HR) =   5.64
  TOTAL STREAM AREA(ACRES) =     5.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     28.63

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      118.02    10.76        4.017        39.43
      2       28.63     6.37        5.635         5.97

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       98.45     6.37       5.635
      2      138.42    10.76       4.017

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =   138.42    Tc(MIN.) =   10.76
  TOTAL AREA(ACRES) =     45.40
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    580.00 =  2987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    595.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   458.00  DOWNSTREAM(FEET) =   443.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  26.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.24
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    138.42
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =  11.21
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    595.00 =  3507.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.912
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7481
  SUBAREA AREA(ACRES) =    2.58   SUBAREA RUNOFF(CFS) =    7.97
  TOTAL AREA(ACRES) =     47.98   TOTAL RUNOFF(CFS) =  140.42
  TC(MIN.) =  11.21

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.912
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7619
  SUBAREA AREA(ACRES) =   6.12    SUBAREA RUNOFF(CFS) =20.83
  TOTAL AREA(ACRES) =     54.10   TOTAL RUNOFF(CFS) =  161.25
  TC(MIN.) =  11.21

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.912
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7643
  SUBAREA AREA(ACRES) =   4.99    SUBAREA RUNOFF(CFS) =15.42
  TOTAL AREA(ACRES) =     59.09   TOTAL RUNOFF(CFS) =  176.67
  TC(MIN.) =  11.21

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    600.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   443.00  DOWNSTREAM(FEET) =   416.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =43.18
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    176.67
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  11.26
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =  3632.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      176.67    11.26       3.901       59.09
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =  3632.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      383.66    13.00       3.556      132.38
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    600.00 =  3081.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc     INTENSITY
  NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
      1     508.96      11.26       3.901
      2     544.68      13.00       3.556

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    544.68   Tc(MIN.) =   13.00
  TOTAL AREA(ACRES) =      191.47
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.556
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7756
  SUBAREA AREA(ACRES) =    5.14   SUBAREA RUNOFF(CFS) =14.44
  TOTAL AREA(ACRES) =    196.61   TOTAL RUNOFF(CFS) =  544.68
  TC(MIN.) =  13.00
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    595.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.556
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7758
  SUBAREA AREA(ACRES) =    3.97   SUBAREA RUNOFF(CFS) =11.15
  TOTAL AREA(ACRES) =    200.58   TOTAL RUNOFF(CFS) =  553.33
  TC(MIN.) =  13.00

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.556
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7760
  SUBAREA AREA(ACRES) =    2.11   SUBAREA RUNOFF(CFS) =    5.93
  TOTAL AREA(ACRES) =    202.69   TOTAL RUNOFF(CFS) =  559.26
  TC(MIN.) =  13.00

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    610.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   416.00  DOWNSTREAM(FEET) =   402.00
  FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  46.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  32.84
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    559.26
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  13.15
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    610.00 =  3912.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    620.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   402.00  DOWNSTREAM(FEET) =   366.00
  FLOW LENGTH(FEET) =   720.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  41.1 INCHES
```

```
   PIPE-FLOW VELOCITY(FEET/SEC.) =  33.50
   GIVEN PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =    559.26
   PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  13.50
   LONGEST FLOWPATH FROM NODE    500.00 TO NODE    620.00 =  4632.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
 ----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.470
   *USER SPECIFIED(SUBAREA):
   NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7500
   S.C.S. CURVE NUMBER (AMC II) =  94
   AREA-AVERAGE RUNOFF COEFFICIENT = 0.7741
   SUBAREA AREA(ACRES) =   16.28   SUBAREA RUNOFF(CFS) =   42.37
   TOTAL AREA(ACRES) =    218.97   TOTAL RUNOFF(CFS) =  588.18
   TC(MIN.) =  13.50
```

Park 'A' flow confluence, Q=42.37

```
 ****************************************************************************
   FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  11
 ----------------------------------------------------------------------------
   >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
 ============================================================================

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     RUNOFF     Tc      INTENSITY     AREA
   NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
       1      559.26    13.50       3.470      202.69
   LONGEST FLOWPATH FROM NODE    500.00 TO NODE    620.00 =  4632.00 FEET.

   ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM     RUNOFF     Tc      INTENSITY     AREA
   NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
       1      362.52    21.03       2.608      177.24
   LONGEST FLOWPATH FROM NODE    300.00 TO NODE    620.00 =  6354.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM    RUNOFF       Tc     INTENSITY
   NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
       1     792.01      13.50        3.470
       2     782.76      21.03        2.608

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =    792.01   Tc(MIN.) =   13.50
   TOTAL AREA(ACRES) =      379.93
 ============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =    379.93  TC(MIN.) =     13.50
   PEAK FLOW RATE(CFS)   =    792.01
 ============================================================================
 ============================================================================
   END OF RATIONAL METHOD ANALYSIS
```

Total Proposed 100-Year, 6-hour flow to Wolf Canyon = 559.3 CFS
Tc = 13.5 min
Total Area = 202.6 acres

***Note: Results do not account for hydromodification measures. See the Hydromodification report for actual flows.**

Appendix E

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                           Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                            *
* PRELIMINARY PROPOSED HYDROLOGY                                        *
* Q2                                                                    *
 ************************************************************************

  FILE NAME: 8020P2.DAT
  TIME/DATE OF STUDY: 15:40 05/12/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =   2.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.100
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    6.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.577
  SUBAREA RUNOFF(CFS) =      5.09
  TOTAL AREA(ACRES) =      2.78   TOTAL RUNOFF(CFS) =      5.09

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    105.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   494.00  DOWNSTREAM(FEET) =   487.20
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.27
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.09
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   6.07
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    58.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   487.20  DOWNSTREAM(FEET) =   484.30
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =7.41
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.09
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   6.35
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   185.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.30  DOWNSTREAM(FEET) =   482.60
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =6.05
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.09
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   6.74
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =   325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   482.60  DOWNSTREAM(FEET) =   468.80
  FLOW LENGTH(FEET) =   433.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =8.61
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.09
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =   7.58
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =   758.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.217
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
```

```
  SUBAREA AREA(ACRES) =     3.87   SUBAREA RUNOFF(CFS) =     6.09
  TOTAL AREA(ACRES) =       6.65   TOTAL RUNOFF(CFS) =    10.47
  TC(MIN.) =    7.58

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.80  DOWNSTREAM(FEET) =   464.60
  FLOW LENGTH(FEET) =   168.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =9.54
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.47
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   7.87
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =   926.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.163
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =     4.75   SUBAREA RUNOFF(CFS) =     7.29
  TOTAL AREA(ACRES) =      11.40   TOTAL RUNOFF(CFS) =    17.51
  TC(MIN.) =    7.87

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.163
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =     4.50   SUBAREA RUNOFF(CFS) =     6.91
  TOTAL AREA(ACRES) =      15.90   TOTAL RUNOFF(CFS) =    24.42
  TC(MIN.) =    7.87

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   464.60  DOWNSTREAM(FEET) =   415.00
  FLOW LENGTH(FEET) =   640.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.72
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     24.42
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   8.47
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =  1566.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.062
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    3.72   SUBAREA RUNOFF(CFS) =    5.45
  TOTAL AREA(ACRES) =     19.62   TOTAL RUNOFF(CFS) =   28.73
  TC(MIN.) =   8.47

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   415.00  DOWNSTREAM(FEET) =   413.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.78
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     28.73
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   8.52
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =  1612.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.054
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    6.69   SUBAREA RUNOFF(CFS) =    9.76
  TOTAL AREA(ACRES) =     26.31   TOTAL RUNOFF(CFS) =   38.38
  TC(MIN.) =   8.52

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   413.00  DOWNSTREAM(FEET) =   386.00
  FLOW LENGTH(FEET) =   371.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.18
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     38.38
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   8.85
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    140.00 =  1983.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.006
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    8.26   SUBAREA RUNOFF(CFS) =   11.76
  TOTAL AREA(ACRES) =     34.57   TOTAL RUNOFF(CFS) =   49.23
  TC(MIN.) =   8.85
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   386.00  DOWNSTREAM(FEET) =   382.50
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.92
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     49.23
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   8.93
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =  2066.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.994
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    2.13   SUBAREA RUNOFF(CFS) =    3.02
  TOTAL AREA(ACRES) =     36.70   TOTAL RUNOFF(CFS) =   51.95
  TC(MIN.) =   8.93

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   382.50  DOWNSTREAM(FEET) =   372.00
  FLOW LENGTH(FEET) =    49.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     51.95
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   8.95
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =  2115.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.95
  RAINFALL INTENSITY(INCH/HR) =   1.99
  TOTAL STREAM AREA(ACRES) =    36.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     51.95

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .9210
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =   16.350
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.350
  SUBAREA RUNOFF(CFS) =     24.99
```

```
  TOTAL AREA(ACRES) =     20.10   TOTAL RUNOFF(CFS) =     24.99

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   511.04  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.99
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     24.99
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =  16.97
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =   520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.318
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9188
  SUBAREA AREA(ACRES) =    0.92   SUBAREA RUNOFF(CFS) =    1.05
  TOTAL AREA(ACRES) =     21.02   TOTAL RUNOFF(CFS) =   25.45
  TC(MIN.) =  16.97

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   488.00
  FLOW LENGTH(FEET) =    81.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  12.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.77
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     25.45
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  17.08
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =   601.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    315.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   488.00  DOWNSTREAM(FEET) =   457.00
  FLOW LENGTH(FEET) =   672.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.73
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     25.45
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =  17.84
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =  1273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.276
```

```
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8823
  SUBAREA AREA(ACRES) =     8.29   SUBAREA RUNOFF(CFS) =     8.35
  TOTAL AREA(ACRES) =     29.31   TOTAL RUNOFF(CFS) =   32.99
  TC(MIN.) =  17.84

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   457.00  DOWNSTREAM(FEET) =   436.50
  FLOW LENGTH(FEET) =   435.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  12.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.97
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     32.99
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =  18.30
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  1708.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.255
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8691
  SUBAREA AREA(ACRES) =     4.92   SUBAREA RUNOFF(CFS) =     4.88
  TOTAL AREA(ACRES) =     34.23   TOTAL RUNOFF(CFS) =   37.34
  TC(MIN.) =  18.30

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.255
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8157
  SUBAREA AREA(ACRES) =     3.92   SUBAREA RUNOFF(CFS) =     1.72
  TOTAL AREA(ACRES) =     38.15   TOTAL RUNOFF(CFS) =   39.06
  TC(MIN.) =  18.30

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    325.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   436.50  DOWNSTREAM(FEET) =   419.50
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.75
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     39.06
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  18.66
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    325.00 =  2068.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.240
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8202
 SUBAREA AREA(ACRES) =    3.41   SUBAREA RUNOFF(CFS) =    3.68
 TOTAL AREA(ACRES) =     41.56   TOTAL RUNOFF(CFS) =   42.25
 TC(MIN.) =  18.66

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.240
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8177
 SUBAREA AREA(ACRES) =    3.80   SUBAREA RUNOFF(CFS) =    3.72
 TOTAL AREA(ACRES) =     45.36   TOTAL RUNOFF(CFS) =   45.98
 TC(MIN.) =  18.66

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    330.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   419.50  DOWNSTREAM(FEET) =   414.00
 FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.42
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     45.98
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  18.80
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =  2207.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.234
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7503
 SUBAREA AREA(ACRES) =    7.63   SUBAREA RUNOFF(CFS) =    3.29
 TOTAL AREA(ACRES) =     52.99   TOTAL RUNOFF(CFS) =   49.05
 TC(MIN.) =  18.80

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    335.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   414.00  DOWNSTREAM(FEET) =   399.00
 FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  16.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.77
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     49.05
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =  19.56
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    335.00 =  2837.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.202
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7562
  SUBAREA AREA(ACRES) =    2.76   SUBAREA RUNOFF(CFS) =    2.89
  TOTAL AREA(ACRES) =     55.75   TOTAL RUNOFF(CFS) =   50.69
  TC(MIN.) =  19.56

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.202
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7596
  SUBAREA AREA(ACRES) =    6.22   SUBAREA RUNOFF(CFS) =    5.91
  TOTAL AREA(ACRES) =     61.97   TOTAL RUNOFF(CFS) =   56.60
  TC(MIN.) =  19.56

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.202
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7641
  SUBAREA AREA(ACRES) =   10.70   SUBAREA RUNOFF(CFS) =   10.16
  TOTAL AREA(ACRES) =     72.67   TOTAL RUNOFF(CFS) =   66.76
  TC(MIN.) =  19.56

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    340.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   399.00  DOWNSTREAM(FEET) =   397.50
  FLOW LENGTH(FEET) =    79.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  19.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.68
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     66.76
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  19.66
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =  2916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.199
```

```
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7564
  SUBAREA AREA(ACRES) =   12.11   SUBAREA RUNOFF(CFS) =   10.31
  TOTAL AREA(ACRES) =     84.78   TOTAL RUNOFF(CFS) =   76.86
  TC(MIN.) =  19.66

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    345.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   397.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =   458.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  20.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.67
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     76.86
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =  20.18
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    345.00 =  3374.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    345.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.178
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7609
  SUBAREA AREA(ACRES) =   13.28   SUBAREA RUNOFF(CFS) =   12.36
  TOTAL AREA(ACRES) =     98.06   TOTAL RUNOFF(CFS) =   87.94
  TC(MIN.) =  20.18

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    350.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.00  DOWNSTREAM(FEET) =   373.40
  FLOW LENGTH(FEET) =   419.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.25
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     87.94
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =  20.56
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =  3793.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.164
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7634
  SUBAREA AREA(ACRES) =    2.27   SUBAREA RUNOFF(CFS) =    2.30
  TOTAL AREA(ACRES) =    100.33   TOTAL RUNOFF(CFS) =   89.18
  TC(MIN.) =  20.56

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    350.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.40  DOWNSTREAM(FEET) =   372.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =15.84
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     89.18
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  20.62
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    150.00 =  3853.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =  20.62
  RAINFALL INTENSITY(INCH/HR) =   1.16
  TOTAL STREAM AREA(ACRES) =   100.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     89.18

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       51.95     8.95        1.990         36.70
      2       89.18    20.62        1.162        100.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       90.68     8.95       1.990
      2      119.51    20.62       1.162

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    119.51   Tc(MIN.) =   20.62
  TOTAL AREA(ACRES) =    137.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    150.00 =  3853.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   372.00  DOWNSTREAM(FEET) =   314.00
  FLOW LENGTH(FEET) =   907.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.75
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    119.51
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =  21.23
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    155.00 =  4760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    210.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    6.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.577
  SUBAREA RUNOFF(CFS) =     14.96
  TOTAL AREA(ACRES) =      7.35   TOTAL RUNOFF(CFS) =     14.96

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.577
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    11.84   SUBAREA RUNOFF(CFS) =   24.10
  TOTAL AREA(ACRES) =     19.19   TOTAL RUNOFF(CFS) =   39.06
  TC(MIN.) =   6.00

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   369.00  DOWNSTREAM(FEET) =   357.00
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =19.47
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     39.06
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   6.15
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =   173.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   357.00  DOWNSTREAM(FEET) =   340.00
  FLOW LENGTH(FEET) =   596.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =13.96
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     39.06
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   6.86
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =   769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.363
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7690
  SUBAREA AREA(ACRES) =    6.82    SUBAREA RUNOFF(CFS) =   11.44
  TOTAL AREA(ACRES) =     26.01   TOTAL RUNOFF(CFS) =   47.28
  TC(MIN.) =   6.86

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    225.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.00  DOWNSTREAM(FEET) =   339.00
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  23.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =9.74
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     47.28
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   7.03
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    225.00 =   871.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    230.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.00  DOWNSTREAM(FEET) =   337.00
  FLOW LENGTH(FEET) =   216.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =9.59
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     47.28
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   7.41
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =  1087.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.249
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7641
  SUBAREA AREA(ACRES) =    2.36   SUBAREA RUNOFF(CFS) =    3.77
  TOTAL AREA(ACRES) =     28.37   TOTAL RUNOFF(CFS) =   48.75
  TC(MIN.) =   7.41

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   337.00  DOWNSTREAM(FEET) =   327.50
  FLOW LENGTH(FEET) =   829.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  19.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.45
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     48.75
  PIPE TRAVEL TIME(MIN.) =   1.32    Tc(MIN.) =   8.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =  1916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.023
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7532
  SUBAREA AREA(ACRES) =   7.17    SUBAREA RUNOFF(CFS) =   10.30
  TOTAL AREA(ACRES) =     35.54   TOTAL RUNOFF(CFS) =   54.15
  TC(MIN.) =   8.73

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.73
  RAINFALL INTENSITY(INCH/HR) =   2.02
  TOTAL STREAM AREA(ACRES) =    35.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     54.15

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    250.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.898
  SUBAREA RUNOFF(CFS) =      4.42
  TOTAL AREA(ACRES) =      2.15   TOTAL RUNOFF(CFS) =      4.42

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  374.00  DOWNSTREAM ELEVATION(FEET) =  358.00
  STREET LENGTH(FEET) =   276.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.25
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.09
  STREET FLOW TRAVEL TIME(MIN.) =   1.06   Tc(MIN.) =   6.06
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.561
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.00     SUBAREA RUNOFF(CFS) =    0.00
  TOTAL AREA(ACRES) =      2.15       PEAK FLOW RATE(CFS) =       4.42
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.25
  FLOW VELOCITY(FEET/SEC.) =  4.35   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    255.00 =  1105.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   358.00  DOWNSTREAM(FEET) =   327.50
  FLOW LENGTH(FEET) =   443.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =11.02
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.42
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   6.73
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    240.00 =  1548.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.393
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    2.52   SUBAREA RUNOFF(CFS) =    4.28
  TOTAL AREA(ACRES) =      4.67   TOTAL RUNOFF(CFS) =    7.94
  TC(MIN.) =   6.73

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.73
  RAINFALL INTENSITY(INCH/HR) =   2.39
  TOTAL STREAM AREA(ACRES) =     4.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.94

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       54.15     8.73        2.023         35.54
      2        7.94     6.73        2.393          4.67

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       49.65     6.73       2.393
      2       60.85     8.73       2.023

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     60.85   Tc(MIN.) =    8.73
  TOTAL AREA(ACRES) =     40.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =  1916.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.50  DOWNSTREAM(FEET) =   325.00
  FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  19.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =12.42
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     60.85
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   8.95
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    260.00 =  2076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   325.00  DOWNSTREAM(FEET) =   314.00
  FLOW LENGTH(FEET) =   428.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.89
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     60.85
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   9.43
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    155.00 =  2504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)    (INCH/HOUR)   (ACRE)
      1       60.85      9.43        1.925       40.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    155.00 =  2504.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)    (INCH/HOUR)   (ACRE)
      1      119.51     21.23        1.140      137.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    155.00 =  4760.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc      INTENSITY
  NUMBER    (CFS)       (MIN.)    (INCH/HOUR)
      1     113.90        9.43         1.925
      2     155.55       21.23         1.140

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    155.55   Tc(MIN.) =   21.23
  TOTAL AREA(ACRES) =      177.24

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.140
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7456
  SUBAREA AREA(ACRES) =     2.07   SUBAREA RUNOFF(CFS) =     1.09
  TOTAL AREA(ACRES) =    179.31   TOTAL RUNOFF(CFS) =  155.55
  TC(MIN.) =  21.23
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   314.00  DOWNSTREAM(FEET) =   179.00
  FLOW LENGTH(FEET) =  1533.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.89
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    155.55
  PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =  22.09
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    160.00 =  6293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    179.00  DOWNSTREAM(FEET) =    178.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    61.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =    7.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    155.55
  FLOW VELOCITY(FEET/SEC.) =  15.04   FLOW DEPTH(FEET) =   1.48
  TRAVEL TIME(MIN.) =   0.07   Tc(MIN.) =  22.16
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    165.00 =  6354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================
```

***Note: Results do not account for hydromodification measures. See the Hydromodification report for actual flows.**

Total Proposed 2-Year, 6-hour flow to Otay River = 155.5 CFS
Tc = 22.16 min
Total Area = 179.3 acres

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                           Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                            *
* PRELIMINARY PROPOSED HYDROLOGY                                        *
* Q10                                                                   *
 ************************************************************************

  FILE NAME: 8020P10.DAT
  TIME/DATE OF STUDY: 15:39 05/12/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.700
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    6.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.982
  SUBAREA RUNOFF(CFS) =      7.86
  TOTAL AREA(ACRES) =      2.78   TOTAL RUNOFF(CFS) =      7.86

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    105.00 IS CODE =  31
------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   494.00  DOWNSTREAM(FEET) =   487.20
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =15.83
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.86
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   6.06
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    58.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   487.20  DOWNSTREAM(FEET) =   484.30
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =8.47
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.86
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   6.31
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   185.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.30  DOWNSTREAM(FEET) =   482.60
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =6.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.86
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   6.66
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =   325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   482.60  DOWNSTREAM(FEET) =   468.80
  FLOW LENGTH(FEET) =   433.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =9.70
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.86
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   7.40
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =   758.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.478
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
```

```
  SUBAREA AREA(ACRES) =     3.87   SUBAREA RUNOFF(CFS) =     9.56
  TOTAL AREA(ACRES) =       6.65   TOTAL RUNOFF(CFS) =    16.42
  TC(MIN.) =    7.40

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.80  DOWNSTREAM(FEET) =   464.60
  FLOW LENGTH(FEET) =   168.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =10.66
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.42
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   7.66
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =   926.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.401
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =   4.75    SUBAREA RUNOFF(CFS) =   11.47
  TOTAL AREA(ACRES) =     11.40   TOTAL RUNOFF(CFS) =   27.52
  TC(MIN.) =   7.66

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.401
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =   4.50    SUBAREA RUNOFF(CFS) =   10.87
  TOTAL AREA(ACRES) =     15.90   TOTAL RUNOFF(CFS) =   38.39
  TC(MIN.) =   7.66

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   464.60  DOWNSTREAM(FEET) =   415.00
  FLOW LENGTH(FEET) =   640.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =19.73
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     38.39
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   8.20
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =  1566.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.254
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    3.72   SUBAREA RUNOFF(CFS) =    8.60
  TOTAL AREA(ACRES) =     19.62   TOTAL RUNOFF(CFS) =   45.33
  TC(MIN.) =   8.20

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   415.00  DOWNSTREAM(FEET) =   413.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.86
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     45.33
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   8.25
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =  1612.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.243
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    6.69   SUBAREA RUNOFF(CFS) =   15.40
  TOTAL AREA(ACRES) =     26.31   TOTAL RUNOFF(CFS) =   60.58
  TC(MIN.) =   8.25

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   413.00  DOWNSTREAM(FEET) =   386.00
  FLOW LENGTH(FEET) =   371.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.96
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     60.58
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   8.53
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    140.00 =  1983.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.173
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    8.26   SUBAREA RUNOFF(CFS) =   18.61
  TOTAL AREA(ACRES) =     34.57   TOTAL RUNOFF(CFS) =   77.89
  TC(MIN.) =   8.53
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   386.00  DOWNSTREAM(FEET) =   382.50
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =18.55
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     77.89
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   8.61
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =  2066.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.156
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =     2.13   SUBAREA RUNOFF(CFS) =    4.77
  TOTAL AREA(ACRES) =     36.70   TOTAL RUNOFF(CFS) =   82.23
  TC(MIN.) =   8.61

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   382.50  DOWNSTREAM(FEET) =   372.00
  FLOW LENGTH(FEET) =    49.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  35.34
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     82.23
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   8.63
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =  2115.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.63
  RAINFALL INTENSITY(INCH/HR) =   3.15
  TOTAL STREAM AREA(ACRES) =    36.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     82.23

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .9210
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =   16.350
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.086
  SUBAREA RUNOFF(CFS) =     38.62
```

```
  TOTAL AREA(ACRES) =     20.10   TOTAL RUNOFF(CFS) =     38.62

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   511.04  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.79
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     38.62
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =  16.90
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =   520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.042
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9188
  SUBAREA AREA(ACRES) =    0.92   SUBAREA RUNOFF(CFS) =    1.63
  TOTAL AREA(ACRES) =     21.02   TOTAL RUNOFF(CFS) =   39.44
  TC(MIN.) =  16.90

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   488.00
  FLOW LENGTH(FEET) =    81.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.25
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     39.44
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  17.00
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =   601.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    315.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   488.00  DOWNSTREAM(FEET) =   457.00
  FLOW LENGTH(FEET) =   672.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.65
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     39.44
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =  17.67
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =  1273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.984
```

```
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8823
  SUBAREA AREA(ACRES) =   8.29    SUBAREA RUNOFF(CFS) =   12.99
  TOTAL AREA(ACRES) =     29.31   TOTAL RUNOFF(CFS) =   51.30
  TC(MIN.) =  17.67

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   457.00  DOWNSTREAM(FEET) =   436.50
  FLOW LENGTH(FEET) =   435.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =18.02
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     51.30
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =  18.08
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  1708.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.955
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8691
  SUBAREA AREA(ACRES) =    4.92   SUBAREA RUNOFF(CFS) =    7.60
  TOTAL AREA(ACRES) =     34.23   TOTAL RUNOFF(CFS) =   58.16
  TC(MIN.) =  18.08

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.955
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8157
  SUBAREA AREA(ACRES) =    3.92   SUBAREA RUNOFF(CFS) =    2.68
  TOTAL AREA(ACRES) =     38.15   TOTAL RUNOFF(CFS) =   60.85
  TC(MIN.) =  18.08

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    325.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   436.50  DOWNSTREAM(FEET) =   419.50
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.86
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     60.85
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =  18.39
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    325.00 =  2068.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.933
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8202
 SUBAREA AREA(ACRES) =    3.41   SUBAREA RUNOFF(CFS) =    5.74
 TOTAL AREA(ACRES) =     41.56   TOTAL RUNOFF(CFS) =   65.90
 TC(MIN.) =  18.39

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.933
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8177
 SUBAREA AREA(ACRES) =    3.80   SUBAREA RUNOFF(CFS) =    5.80
 TOTAL AREA(ACRES) =     45.36   TOTAL RUNOFF(CFS) =   71.71
 TC(MIN.) =  18.39

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    330.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   419.50  DOWNSTREAM(FEET) =   414.00
 FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.38
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     71.71
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  18.52
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =  2207.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.925
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7503
 SUBAREA AREA(ACRES) =    7.63   SUBAREA RUNOFF(CFS) =    5.14
 TOTAL AREA(ACRES) =     52.99   TOTAL RUNOFF(CFS) =   76.53
 TC(MIN.) =  18.52

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    335.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   414.00  DOWNSTREAM(FEET) =   399.00
 FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  21.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.46
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     76.53
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =  19.20
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    335.00 =  2837.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.881
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7562
  SUBAREA AREA(ACRES) =    2.76   SUBAREA RUNOFF(CFS) =    4.52
  TOTAL AREA(ACRES) =     55.75   TOTAL RUNOFF(CFS) =   79.29
  TC(MIN.) =  19.20

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.881
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7596
  SUBAREA AREA(ACRES) =    6.22   SUBAREA RUNOFF(CFS) =    9.24
  TOTAL AREA(ACRES) =     61.97   TOTAL RUNOFF(CFS) =   88.53
  TC(MIN.) =  19.20

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.881
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7641
  SUBAREA AREA(ACRES) =   10.70   SUBAREA RUNOFF(CFS) =   15.90
  TOTAL AREA(ACRES) =     72.67   TOTAL RUNOFF(CFS) =  104.43
  TC(MIN.) =  19.20

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    340.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   399.00  DOWNSTREAM(FEET) =   397.50
  FLOW LENGTH(FEET) =    79.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  25.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.34
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    104.43
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  19.29
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =  2916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.875
```

```
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7564
  SUBAREA AREA(ACRES) =   12.11   SUBAREA RUNOFF(CFS) =16.12
  TOTAL AREA(ACRES) =     84.78   TOTAL RUNOFF(CFS) =  120.25
  TC(MIN.) =  19.29

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    345.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   397.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =   458.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  27.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.40
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    120.25
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =  19.75
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    345.00 =  3374.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    345.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.847
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7609
  SUBAREA AREA(ACRES) =   13.28   SUBAREA RUNOFF(CFS) =   19.37
  TOTAL AREA(ACRES) =     98.06   TOTAL RUNOFF(CFS) =  137.79
  TC(MIN.) =  19.75

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    350.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.00  DOWNSTREAM(FEET) =   373.40
  FLOW LENGTH(FEET) =   419.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  23.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.62
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    137.79
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =  20.09
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =  3793.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.826
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7634
  SUBAREA AREA(ACRES) =    2.27   SUBAREA RUNOFF(CFS) =    3.61
  TOTAL AREA(ACRES) =    100.33   TOTAL RUNOFF(CFS) =  139.89
  TC(MIN.) =  20.09

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    350.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   373.40  DOWNSTREAM(FEET) =   372.00
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  26.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =17.84
 GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    139.89
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  20.15
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    150.00 =  3853.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
 TIME OF CONCENTRATION(MIN.) =  20.15
 RAINFALL INTENSITY(INCH/HR) =   1.82
 TOTAL STREAM AREA(ACRES) =   100.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    139.89

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       82.23     8.63        3.150         36.70
     2      139.89    20.15        1.823        100.33

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc     INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      142.15     8.63       3.150
     2      187.48    20.15       1.823

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    187.48   Tc(MIN.) =   20.15
 TOTAL AREA(ACRES) =    137.03
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    150.00 =  3853.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   372.00  DOWNSTREAM(FEET) =   314.00
 FLOW LENGTH(FEET) =   907.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  23.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.96
 GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    187.48
 PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =  20.69
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    155.00 =  4760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    210.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    6.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.982
  SUBAREA RUNOFF(CFS) =     23.12
  TOTAL AREA(ACRES) =      7.35   TOTAL RUNOFF(CFS) =     23.12

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.982
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    11.84   SUBAREA RUNOFF(CFS) =   37.25
  TOTAL AREA(ACRES) =     19.19   TOTAL RUNOFF(CFS) =   60.37
  TC(MIN.) =   6.00

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   369.00  DOWNSTREAM(FEET) =   357.00
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  16.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =21.73
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     60.37
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   6.13
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =   173.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   357.00  DOWNSTREAM(FEET) =   340.00
  FLOW LENGTH(FEET) =   596.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =15.19
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     60.37
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   6.79
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =   769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.678
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7690
  SUBAREA AREA(ACRES) =    6.82    SUBAREA RUNOFF(CFS) =   17.81
  TOTAL AREA(ACRES) =     26.01   TOTAL RUNOFF(CFS) =   73.57
  TC(MIN.) =   6.79

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    225.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.00  DOWNSTREAM(FEET) =   339.00
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.41
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  36.00  NUMBER OF PIPES =  1
  PIPE-FLOW(CFS) =     73.57
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   6.95
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    225.00 =   871.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    230.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.00  DOWNSTREAM(FEET) =   337.00
  FLOW LENGTH(FEET) =   216.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  25.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =10.73
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     73.57
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   7.29
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =  1087.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.513
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7641
  SUBAREA AREA(ACRES) =    2.36   SUBAREA RUNOFF(CFS) =    5.89
  TOTAL AREA(ACRES) =     28.37   TOTAL RUNOFF(CFS) =   76.16
  TC(MIN.) =   7.29

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   337.00  DOWNSTREAM(FEET) =   327.50
  FLOW LENGTH(FEET) =   829.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.73
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     76.16
  PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =   8.46
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =  1916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.190
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7532
  SUBAREA AREA(ACRES) =   7.17    SUBAREA RUNOFF(CFS) =   16.24
  TOTAL AREA(ACRES) =     35.54   TOTAL RUNOFF(CFS) =   85.39
  TC(MIN.) =   8.46

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.46
  RAINFALL INTENSITY(INCH/HR) =   3.19
  TOTAL STREAM AREA(ACRES) =    35.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     85.39

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    250.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
  SUBAREA RUNOFF(CFS) =      6.84
  TOTAL AREA(ACRES) =      2.15   TOTAL RUNOFF(CFS) =      6.84

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  374.00  DOWNSTREAM ELEVATION(FEET) =  358.00
  STREET LENGTH(FEET) =   276.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.84
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.33
  STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   5.97
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.994
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.00      SUBAREA RUNOFF(CFS) =    0.00
  TOTAL AREA(ACRES) =      2.15        PEAK FLOW RATE(CFS) =       6.84
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.78
  FLOW VELOCITY(FEET/SEC.) =  4.73   DEPTH*VELOCITY(FT*FT/SEC.) =   1.33
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    255.00 =  1105.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   358.00  DOWNSTREAM(FEET) =   327.50
  FLOW LENGTH(FEET) =   443.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =12.46
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.84
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   6.57
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    240.00 =  1548.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.758
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =     2.52   SUBAREA RUNOFF(CFS) =    6.72
  TOTAL AREA(ACRES) =      4.67   TOTAL RUNOFF(CFS) =   12.46
  TC(MIN.) =   6.57

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.57
  RAINFALL INTENSITY(INCH/HR) =   3.76
  TOTAL STREAM AREA(ACRES) =     4.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.46

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       85.39     8.46        3.190        35.54
      2       12.46     6.57        3.758         4.67

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       78.70     6.57       3.758
      2       95.96     8.46       3.190

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     95.96   Tc(MIN.) =    8.46
  TOTAL AREA(ACRES) =     40.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =  1916.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.50  DOWNSTREAM(FEET) =   325.00
  FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =13.96
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     95.96
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   8.65
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    260.00 =  2076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   325.00  DOWNSTREAM(FEET) =   314.00
  FLOW LENGTH(FEET) =   428.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  22.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.82
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     95.96
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   9.08
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    155.00 =  2504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       95.96     9.08       3.049       40.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    155.00 =  2504.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      187.48    20.69       1.792      137.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    155.00 =  4760.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc     INTENSITY
  NUMBER    (CFS)       (MIN.)   (INCH/HOUR)
      1     178.24        9.08        3.049
      2     243.90       20.69        1.792

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    243.90   Tc(MIN.) =   20.69
  TOTAL AREA(ACRES) =      177.24

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.792
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7456
  SUBAREA AREA(ACRES) =    2.07   SUBAREA RUNOFF(CFS) =    1.71
  TOTAL AREA(ACRES) =    179.31   TOTAL RUNOFF(CFS) =  243.90
  TC(MIN.) =  20.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   314.00  DOWNSTREAM(FEET) =   179.00
  FLOW LENGTH(FEET) =  1533.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  25.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.71
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    243.90
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =  21.44
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    160.00 =  6293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    179.00  DOWNSTREAM(FEET) =    178.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    61.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =    7.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    243.90
  FLOW VELOCITY(FEET/SEC.) =  17.26   FLOW DEPTH(FEET) =   2.02
  TRAVEL TIME(MIN.) =   0.06   Tc(MIN.) =  21.50
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    165.00 =  6354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================
```

Total Proposed 10-Year, 6-hour flow to Otay River = 243.9 CFS
Tc = 21.50 min
Total Area = 179.3 acres

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                           Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                             *
* PRELIMINARY PROPOSED HYDROLOGY                                         *
* Q25                                                                    *
 ************************************************************************

  FILE NAME: 8020P25.DAT
  TIME/DATE OF STUDY: 15:28 05/12/2011
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  25.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.800
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  22
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    6.000
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.216
  SUBAREA RUNOFF(CFS) =      8.32
  TOTAL AREA(ACRES) =      2.78   TOTAL RUNOFF(CFS) =      8.32

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    105.00 IS CODE =  31
--------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   494.00  DOWNSTREAM(FEET) =   487.20
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.04
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.32
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   6.06
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    58.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   487.20  DOWNSTREAM(FEET) =   484.30
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =8.54
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.32
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   6.31
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   185.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.30  DOWNSTREAM(FEET) =   482.60
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =6.83
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.32
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   6.65
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =   325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   482.60  DOWNSTREAM(FEET) =   468.80
  FLOW LENGTH(FEET) =   433.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =9.81
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.32
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   7.39
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =   758.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.688
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
```

```
  SUBAREA AREA(ACRES) =     3.87   SUBAREA RUNOFF(CFS) =   10.13
  TOTAL AREA(ACRES) =       6.65   TOTAL RUNOFF(CFS) =   17.41
  TC(MIN.) =   7.39

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.80  DOWNSTREAM(FEET) =   464.60
  FLOW LENGTH(FEET) =   168.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =10.79
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     17.41
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   7.64
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =   926.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.606
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =   4.75    SUBAREA RUNOFF(CFS) =   12.16
  TOTAL AREA(ACRES) =     11.40   TOTAL RUNOFF(CFS) =   29.19
  TC(MIN.) =   7.64

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.606
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =   4.50    SUBAREA RUNOFF(CFS) =   11.52
  TOTAL AREA(ACRES) =     15.90   TOTAL RUNOFF(CFS) =   40.71
  TC(MIN.) =   7.64

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   464.60  DOWNSTREAM(FEET) =   415.00
  FLOW LENGTH(FEET) =   640.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =19.82
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     40.71
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   8.18
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =  1566.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.452
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    3.72   SUBAREA RUNOFF(CFS) =    9.12
  TOTAL AREA(ACRES) =     19.62   TOTAL RUNOFF(CFS) =   48.08
  TC(MIN.) =   8.18

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   415.00  DOWNSTREAM(FEET) =   413.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.06
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     48.08
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   8.23
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =  1612.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.440
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    6.69   SUBAREA RUNOFF(CFS) =   16.34
  TOTAL AREA(ACRES) =     26.31   TOTAL RUNOFF(CFS) =   64.25
  TC(MIN.) =   8.23

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   413.00  DOWNSTREAM(FEET) =   386.00
  FLOW LENGTH(FEET) =   371.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.20
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     64.25
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   8.51
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    140.00 =  1983.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.366
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    8.26   SUBAREA RUNOFF(CFS) =   19.74
  TOTAL AREA(ACRES) =     34.57   TOTAL RUNOFF(CFS) =   82.63
  TC(MIN.) =   8.51
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   386.00  DOWNSTREAM(FEET) =   382.50
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =19.28
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     82.63
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   8.58
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =  2066.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.348
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =     2.13   SUBAREA RUNOFF(CFS) =    5.06
  TOTAL AREA(ACRES) =     36.70   TOTAL RUNOFF(CFS) =   87.24
  TC(MIN.) =   8.58

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   382.50  DOWNSTREAM(FEET) =   372.00
  FLOW LENGTH(FEET) =    49.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  35.67
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     87.24
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   8.60
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =  2115.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.60
  RAINFALL INTENSITY(INCH/HR) =   3.34
  TOTAL STREAM AREA(ACRES) =    36.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     87.24

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .9210
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =   16.350
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.209
  SUBAREA RUNOFF(CFS) =     40.89
```

```
  TOTAL AREA(ACRES) =     20.10   TOTAL RUNOFF(CFS) =     40.89

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   511.04  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.04
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     40.89
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =  16.89
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =   520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.163
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9188
  SUBAREA AREA(ACRES) =    0.92   SUBAREA RUNOFF(CFS) =    1.73
  TOTAL AREA(ACRES) =     21.02   TOTAL RUNOFF(CFS) =   41.77
  TC(MIN.) =  16.89

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   488.00
  FLOW LENGTH(FEET) =    81.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.45
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     41.77
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  16.99
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =   601.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    315.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   488.00  DOWNSTREAM(FEET) =   457.00
  FLOW LENGTH(FEET) =   672.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.92
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     41.77
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =  17.65
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =  1273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.102
```

```
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8823
  SUBAREA AREA(ACRES) =   8.29    SUBAREA RUNOFF(CFS) =   13.77
  TOTAL AREA(ACRES) =     29.31   TOTAL RUNOFF(CFS) =   54.36
  TC(MIN.) =  17.65

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   457.00  DOWNSTREAM(FEET) =   436.50
  FLOW LENGTH(FEET) =   435.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =18.30
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     54.36
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =  18.05
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  1708.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.072
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8691
  SUBAREA AREA(ACRES) =    4.92   SUBAREA RUNOFF(CFS) =    8.05
  TOTAL AREA(ACRES) =     34.23   TOTAL RUNOFF(CFS) =   61.64
  TC(MIN.) =  18.05

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.072
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8157
  SUBAREA AREA(ACRES) =    3.92   SUBAREA RUNOFF(CFS) =    2.84
  TOTAL AREA(ACRES) =     38.15   TOTAL RUNOFF(CFS) =   64.49
  TC(MIN.) =  18.05

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    325.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   436.50  DOWNSTREAM(FEET) =   419.50
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.14
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     64.49
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =  18.36
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    325.00 =  2068.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.049
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8202
 SUBAREA AREA(ACRES) =    3.41   SUBAREA RUNOFF(CFS) =    6.08
 TOTAL AREA(ACRES) =     41.56   TOTAL RUNOFF(CFS) =   69.86
 TC(MIN.) =  18.36

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.049
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8177
 SUBAREA AREA(ACRES) =    3.80   SUBAREA RUNOFF(CFS) =    6.15
 TOTAL AREA(ACRES) =     45.36   TOTAL RUNOFF(CFS) =   76.01
 TC(MIN.) =  18.36

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    330.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   419.50  DOWNSTREAM(FEET) =   414.00
 FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  20.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.64
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     76.01
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  18.49
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =  2207.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.040
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7503
 SUBAREA AREA(ACRES) =    7.63   SUBAREA RUNOFF(CFS) =    5.45
 TOTAL AREA(ACRES) =     52.99   TOTAL RUNOFF(CFS) =   81.13
 TC(MIN.) =  18.49

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    335.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   414.00  DOWNSTREAM(FEET) =   399.00
 FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  22.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.68
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     81.13
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =  19.16
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    335.00 =  2837.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.994
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7562
  SUBAREA AREA(ACRES) =    2.76   SUBAREA RUNOFF(CFS) =    4.79
  TOTAL AREA(ACRES) =     55.75   TOTAL RUNOFF(CFS) =   84.07
  TC(MIN.) =  19.16

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.994
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7596
  SUBAREA AREA(ACRES) =    6.22   SUBAREA RUNOFF(CFS) =    9.80
  TOTAL AREA(ACRES) =     61.97   TOTAL RUNOFF(CFS) =   93.87
  TC(MIN.) =  19.16

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.994
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7641
  SUBAREA AREA(ACRES) =   10.70   SUBAREA RUNOFF(CFS) =   16.86
  TOTAL AREA(ACRES) =     72.67   TOTAL RUNOFF(CFS) =  110.73
  TC(MIN.) =  19.16

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    340.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   399.00  DOWNSTREAM(FEET) =   397.50
  FLOW LENGTH(FEET) =    79.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  26.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.55
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    110.73
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  19.24
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =  2916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.988
```

```
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7564
  SUBAREA AREA(ACRES) =   12.11   SUBAREA RUNOFF(CFS) =17.10
  TOTAL AREA(ACRES) =     84.78   TOTAL RUNOFF(CFS) =  127.51
  TC(MIN.) =  19.24

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    345.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   397.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =   458.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  28.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.62
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    127.51
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =  19.70
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    345.00 =  3374.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    345.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.958
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7609
  SUBAREA AREA(ACRES) =   13.28   SUBAREA RUNOFF(CFS) =   20.55
  TOTAL AREA(ACRES) =     98.06   TOTAL RUNOFF(CFS) =  146.13
  TC(MIN.) =  19.70

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    350.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.00  DOWNSTREAM(FEET) =   373.40
  FLOW LENGTH(FEET) =   419.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  24.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.94
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    146.13
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =  20.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =  3793.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.937
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7634
  SUBAREA AREA(ACRES) =    2.27   SUBAREA RUNOFF(CFS) =    3.83
  TOTAL AREA(ACRES) =    100.33   TOTAL RUNOFF(CFS) =  148.38
  TC(MIN.) =  20.03

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    350.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.40  DOWNSTREAM(FEET) =   372.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  27.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =18.10
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    148.38
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  20.09
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    150.00 =  3853.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  20.09
  RAINFALL INTENSITY(INCH/HR) =   1.93
  TOTAL STREAM AREA(ACRES) =   100.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    148.38

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       87.24     8.60        3.342         36.70
      2      148.38    20.09        1.934        100.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      150.77     8.60       3.342
      2      198.86    20.09       1.934

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    198.86   Tc(MIN.) =   20.09
  TOTAL AREA(ACRES) =    137.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    150.00 =  3853.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   372.00  DOWNSTREAM(FEET) =   314.00
  FLOW LENGTH(FEET) =   907.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  24.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.40
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    198.86
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =  20.62
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    155.00 =  4760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    210.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    6.000
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.216
  SUBAREA RUNOFF(CFS) =     24.48
  TOTAL AREA(ACRES) =      7.35   TOTAL RUNOFF(CFS) =     24.48

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.216
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    11.84   SUBAREA RUNOFF(CFS) =   39.44
  TOTAL AREA(ACRES) =     19.19   TOTAL RUNOFF(CFS) =   63.92
  TC(MIN.) =   6.00

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   369.00  DOWNSTREAM(FEET) =   357.00
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =22.02
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     63.92
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   6.13
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =   173.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   357.00  DOWNSTREAM(FEET) =   340.00
  FLOW LENGTH(FEET) =   596.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =15.26
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     63.92
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   6.78
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =   769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.896
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7690
  SUBAREA AREA(ACRES) =    6.82    SUBAREA RUNOFF(CFS) =   18.87
  TOTAL AREA(ACRES) =     26.01   TOTAL RUNOFF(CFS) =   77.93
  TC(MIN.) =   6.78

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    225.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.00  DOWNSTREAM(FEET) =   339.00
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.02
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  36.00  NUMBER OF PIPES =  1
  PIPE-FLOW(CFS) =     77.93
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   6.94
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    225.00 =   871.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    230.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.00  DOWNSTREAM(FEET) =   337.00
  FLOW LENGTH(FEET) =   216.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  26.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =10.88
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     77.93
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   7.27
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =  1087.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.726
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7641
  SUBAREA AREA(ACRES) =    2.36   SUBAREA RUNOFF(CFS) =    6.24
  TOTAL AREA(ACRES) =     28.37   TOTAL RUNOFF(CFS) =   80.78
  TC(MIN.) =   7.27

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   337.00  DOWNSTREAM(FEET) =   327.50
  FLOW LENGTH(FEET) =   829.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  25.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.90
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     80.78
  PIPE TRAVEL TIME(MIN.) =   1.16    Tc(MIN.) =   8.43
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =  1916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.387
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7532
  SUBAREA AREA(ACRES) =   7.17    SUBAREA RUNOFF(CFS) =   17.24
  TOTAL AREA(ACRES) =     35.54   TOTAL RUNOFF(CFS) =   90.65
  TC(MIN.) =   8.43

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.43
  RAINFALL INTENSITY(INCH/HR) =   3.39
  TOTAL STREAM AREA(ACRES) =
  35.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     90.65

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    250.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.743
  SUBAREA RUNOFF(CFS) =      7.24
  TOTAL AREA(ACRES) =      2.15   TOTAL RUNOFF(CFS) =      7.24

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  374.00  DOWNSTREAM ELEVATION(FEET) =  358.00
  STREET LENGTH(FEET) =   276.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.24
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.37
  STREET FLOW TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =   5.96
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.235
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.00      SUBAREA RUNOFF(CFS) =    0.00
  TOTAL AREA(ACRES) =      2.15        PEAK FLOW RATE(CFS) =       7.24
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   7.97
  FLOW VELOCITY(FEET/SEC.) =  4.80   DEPTH*VELOCITY(FT*FT/SEC.) =   1.37
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    255.00 =  1105.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   358.00  DOWNSTREAM(FEET) =   327.50
  FLOW LENGTH(FEET) =   443.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =12.65
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.24
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   6.54
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    240.00 =  1548.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.988
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =     2.52   SUBAREA RUNOFF(CFS) =    7.13
  TOTAL AREA(ACRES) =      4.67   TOTAL RUNOFF(CFS) =   13.22
  TC(MIN.) =   6.54

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.54
  RAINFALL INTENSITY(INCH/HR) =   3.99
  TOTAL STREAM AREA(ACRES) =     4.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.22

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       90.65     8.43        3.387        35.54
      2       13.22     6.54        3.988         4.67

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       83.59     6.54       3.988
      2      101.88     8.43       3.387

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    101.88   Tc(MIN.) =    8.43
  TOTAL AREA(ACRES) =     40.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =  1916.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.50  DOWNSTREAM(FEET) =   325.00
  FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  26.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.16
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    101.88
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   8.62
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    260.00 =  2076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   325.00  DOWNSTREAM(FEET) =   314.00
  FLOW LENGTH(FEET) =   428.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.08
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    101.88
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   9.03
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    155.00 =  2504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      101.88     9.03        3.238       40.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    155.00 =  2504.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      198.86    20.62        1.902      137.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    155.00 =  4760.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc     INTENSITY
  NUMBER    (CFS)       (MIN.)   (INCH/HOUR)
      1     189.00        9.03        3.238
      2     258.69       20.62        1.902

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    258.69   Tc(MIN.) =   20.62
  TOTAL AREA(ACRES) =      177.24

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.902
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7456
  SUBAREA AREA(ACRES) =    2.07   SUBAREA RUNOFF(CFS) =    1.81
  TOTAL AREA(ACRES) =    179.31   TOTAL RUNOFF(CFS) =  258.69
  TC(MIN.) =  20.62
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   314.00  DOWNSTREAM(FEET) =   179.00
  FLOW LENGTH(FEET) =  1533.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  26.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.22
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    258.69
  PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =  21.37
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    160.00 =  6293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    179.00  DOWNSTREAM(FEET) =    178.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    61.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =    7.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    258.69
  FLOW VELOCITY(FEET/SEC.) =  17.57   FLOW DEPTH(FEET) =   2.10
  TRAVEL TIME(MIN.) =   0.06   Tc(MIN.) =  21.43
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    165.00 =  6354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================
```

Total Proposed 25-Year, 6-hour flow to Otay River = 258.7 CFS
Tc = 21.43 min
Total Area = 179.3 acres

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                             *
* PRELIMINARY PROPOSED HYDROLOGY                                         *
* Q50                                                                    *
 ************************************************************************

  FILE NAME: 8020P50.DAT
  TIME/DATE OF STUDY: 15:22 05/12/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    6.000
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.153
  SUBAREA RUNOFF(CFS) =     10.17
  TOTAL AREA(ACRES) =      2.78   TOTAL RUNOFF(CFS) =     10.17

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    105.00 IS CODE =  31
------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   494.00  DOWNSTREAM(FEET) =   487.20
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.62
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.17
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   6.06
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    58.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   487.20  DOWNSTREAM(FEET) =   484.30
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =9.15
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.17
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   6.29
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   185.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.30  DOWNSTREAM(FEET) =   482.60
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =7.06
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.17
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   6.62
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =   325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   482.60  DOWNSTREAM(FEET) =   468.80
  FLOW LENGTH(FEET) =   433.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =10.12
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.17
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   7.33
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =   758.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.528
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
```

```
  SUBAREA AREA(ACRES) =     3.87   SUBAREA RUNOFF(CFS) =   12.44
  TOTAL AREA(ACRES) =       6.65   TOTAL RUNOFF(CFS) =   21.38
  TC(MIN.) =   7.33

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.80  DOWNSTREAM(FEET) =   464.60
  FLOW LENGTH(FEET) =   168.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =11.18
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     21.38
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   7.58
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =   926.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.431
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =   4.75    SUBAREA RUNOFF(CFS) =   14.94
  TOTAL AREA(ACRES) =     11.40   TOTAL RUNOFF(CFS) =   35.86
  TC(MIN.) =   7.58

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.431
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =   4.50    SUBAREA RUNOFF(CFS) =   14.16
  TOTAL AREA(ACRES) =     15.90   TOTAL RUNOFF(CFS) =   50.02
  TC(MIN.) =   7.58

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   464.60  DOWNSTREAM(FEET) =   415.00
  FLOW LENGTH(FEET) =   640.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =21.29
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     50.02
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   8.08
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =  1566.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.252
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =   3.72    SUBAREA RUNOFF(CFS) =   11.23
  TOTAL AREA(ACRES) =     19.62   TOTAL RUNOFF(CFS) =   59.23
  TC(MIN.) =   8.08

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   415.00  DOWNSTREAM(FEET) =   413.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =17.55
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     59.23
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   8.13
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =  1612.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.237
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    6.69   SUBAREA RUNOFF(CFS) =   20.12
  TOTAL AREA(ACRES) =     26.31   TOTAL RUNOFF(CFS) =   79.15
  TC(MIN.) =   8.13

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   413.00  DOWNSTREAM(FEET) =   386.00
  FLOW LENGTH(FEET) =   371.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.72
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     79.15
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   8.40
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    140.00 =  1983.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.148
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    8.26   SUBAREA RUNOFF(CFS) =   24.33
  TOTAL AREA(ACRES) =     34.57   TOTAL RUNOFF(CFS) =  101.81
  TC(MIN.) =   8.40
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   386.00  DOWNSTREAM(FEET) =   382.50
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =19.77
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    101.81
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   8.47
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =  2066.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.126
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    2.13   SUBAREA RUNOFF(CFS) =    6.24
  TOTAL AREA(ACRES) =     36.70   TOTAL RUNOFF(CFS) =  107.50
  TC(MIN.) =   8.47

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   382.50  DOWNSTREAM(FEET) =   372.00
  FLOW LENGTH(FEET) =    49.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  37.92
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    107.50
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   8.49
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =  2115.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.49
  RAINFALL INTENSITY(INCH/HR) =   4.12
  TOTAL STREAM AREA(ACRES) =    36.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    107.50

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .9210
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =   16.350
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.699
  SUBAREA RUNOFF(CFS) =     49.97
```

```
  TOTAL AREA(ACRES) =     20.10   TOTAL RUNOFF(CFS) =     49.97

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   511.04  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.92
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     49.97
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =  16.86
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =   520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.646
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9188
  SUBAREA AREA(ACRES) =    0.92   SUBAREA RUNOFF(CFS) =    2.12
  TOTAL AREA(ACRES) =     21.02   TOTAL RUNOFF(CFS) =   51.11
  TC(MIN.) =  16.86

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   488.00
  FLOW LENGTH(FEET) =    81.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.16
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     51.11
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  16.96
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =   601.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    315.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   488.00  DOWNSTREAM(FEET) =   457.00
  FLOW LENGTH(FEET) =   672.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.86
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     51.11
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =  17.58
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =  1273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.576
```

```
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8823
  SUBAREA AREA(ACRES) =   8.29    SUBAREA RUNOFF(CFS) =   16.87
  TOTAL AREA(ACRES) =     29.31   TOTAL RUNOFF(CFS) =   66.61
  TC(MIN.) =  17.58

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   457.00  DOWNSTREAM(FEET) =   436.50
  FLOW LENGTH(FEET) =   435.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =19.28
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     66.61
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =  17.96
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  1708.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.541
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8691
  SUBAREA AREA(ACRES) =    4.92   SUBAREA RUNOFF(CFS) =    9.88
  TOTAL AREA(ACRES) =     34.23   TOTAL RUNOFF(CFS) =   75.58
  TC(MIN.) =  17.96

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.541
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8157
  SUBAREA AREA(ACRES) =    3.92   SUBAREA RUNOFF(CFS) =    3.49
  TOTAL AREA(ACRES) =     38.15   TOTAL RUNOFF(CFS) =   79.07
  TC(MIN.) =  17.96

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    325.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   436.50  DOWNSTREAM(FEET) =   419.50
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.13
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     79.07
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =  18.26
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    325.00 =  2068.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.514
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8202
 SUBAREA AREA(ACRES) =    3.41   SUBAREA RUNOFF(CFS) =    7.46
 TOTAL AREA(ACRES) =     41.56   TOTAL RUNOFF(CFS) =   85.69
 TC(MIN.) =  18.26

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.514
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8177
 SUBAREA AREA(ACRES) =    3.80   SUBAREA RUNOFF(CFS) =    7.55
 TOTAL AREA(ACRES) =     45.36   TOTAL RUNOFF(CFS) =   93.24
 TC(MIN.) =  18.26

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    330.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   419.50  DOWNSTREAM(FEET) =   414.00
 FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  23.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.49
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     93.24
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  18.38
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =  2207.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.503
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7503
 SUBAREA AREA(ACRES) =    7.63   SUBAREA RUNOFF(CFS) =    6.69
 TOTAL AREA(ACRES) =     52.99   TOTAL RUNOFF(CFS) =   99.53
 TC(MIN.) =  18.38

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    335.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   414.00  DOWNSTREAM(FEET) =   399.00
 FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  25.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.44
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     99.53
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =  19.02
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    335.00 =  2837.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.449
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7562
  SUBAREA AREA(ACRES) =     2.76   SUBAREA RUNOFF(CFS) =    5.88
  TOTAL AREA(ACRES) =     55.75   TOTAL RUNOFF(CFS) =  103.24
  TC(MIN.) =  19.02

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.449
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7596
  SUBAREA AREA(ACRES) =     6.22   SUBAREA RUNOFF(CFS) =   12.03
  TOTAL AREA(ACRES) =     61.97   TOTAL RUNOFF(CFS) =  115.28
  TC(MIN.) =  19.02

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.449
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7641
  SUBAREA AREA(ACRES) =    10.70   SUBAREA RUNOFF(CFS) =   20.70
  TOTAL AREA(ACRES) =     72.67   TOTAL RUNOFF(CFS) =  135.98
  TC(MIN.) =  19.02

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    340.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   399.00  DOWNSTREAM(FEET) =   397.50
  FLOW LENGTH(FEET) =    79.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  30.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.28
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    135.98
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  19.10
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =  2916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.442
```

```
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7564
  SUBAREA AREA(ACRES) =   12.11   SUBAREA RUNOFF(CFS) =21.00
  TOTAL AREA(ACRES) =     84.78   TOTAL RUNOFF(CFS) =  156.60
  TC(MIN.) =  19.10

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    345.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   397.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =   458.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  32.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =17.34
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    156.60
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  19.54
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    345.00 =  3374.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    345.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.407
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7609
  SUBAREA AREA(ACRES) =   13.28   SUBAREA RUNOFF(CFS) =   25.25
  TOTAL AREA(ACRES) =     98.06   TOTAL RUNOFF(CFS) =  179.57
  TC(MIN.) =  19.54

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    350.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.00  DOWNSTREAM(FEET) =   373.40
  FLOW LENGTH(FEET) =   419.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  27.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.06
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    179.57
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =  19.85
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =  3793.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.382
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7634
  SUBAREA AREA(ACRES) =    2.27   SUBAREA RUNOFF(CFS) =    4.70
  TOTAL AREA(ACRES) =    100.33   TOTAL RUNOFF(CFS) =  182.42
  TC(MIN.) =  19.85

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    350.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.40  DOWNSTREAM(FEET) =   372.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  31.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =19.01
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    182.42
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  19.91
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    150.00 =  3853.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.91
  RAINFALL INTENSITY(INCH/HR) =   2.38
  TOTAL STREAM AREA(ACRES) =   100.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    182.42

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      107.50     8.49        4.119         36.70
      2      182.42    19.91        2.378        100.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      185.32     8.49       4.119
      2      244.47    19.91       2.378

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    244.47   Tc(MIN.) =   19.91
  TOTAL AREA(ACRES) =    137.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    150.00 =  3853.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   372.00  DOWNSTREAM(FEET) =   314.00
  FLOW LENGTH(FEET) =   907.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  27.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.93
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    244.47
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =  20.41
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    155.00 =  4760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    210.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    6.000
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.153
  SUBAREA RUNOFF(CFS) =     29.92
  TOTAL AREA(ACRES) =      7.35   TOTAL RUNOFF(CFS) =     29.92

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.153
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =   11.84   SUBAREA RUNOFF(CFS) =   48.20
  TOTAL AREA(ACRES) =     19.19   TOTAL RUNOFF(CFS) =   78.13
  TC(MIN.) =   6.00

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   369.00  DOWNSTREAM(FEET) =   357.00
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =22.98
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     78.13
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   6.13
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =   173.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   357.00  DOWNSTREAM(FEET) =   340.00
  FLOW LENGTH(FEET) =   596.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.92
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  30.00  NUMBER OF PIPES =  1
  PIPE-FLOW(CFS) =     78.13
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   6.75
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =   769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.777
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7690
  SUBAREA AREA(ACRES) =   6.82    SUBAREA RUNOFF(CFS) =   23.13
  TOTAL AREA(ACRES) =     26.01   TOTAL RUNOFF(CFS) =   95.54
  TC(MIN.) =   6.75

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    225.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.00  DOWNSTREAM(FEET) =   339.00
  FLOW LENGTH(FEET) =   102.00    MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.52
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  36.00   NUMBER OF PIPES =  1
  PIPE-FLOW(CFS) =     95.54
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   6.88
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    225.00 =   871.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    230.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.00  DOWNSTREAM(FEET) =   337.00
  FLOW LENGTH(FEET) =   216.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  30.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =11.38
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     95.54
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   7.19
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =  1087.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.585
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7641
  SUBAREA AREA(ACRES) =    2.36   SUBAREA RUNOFF(CFS) =    7.68
  TOTAL AREA(ACRES) =     28.37   TOTAL RUNOFF(CFS) =   99.39
  TC(MIN.) =   7.19

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   337.00  DOWNSTREAM(FEET) =   327.50
  FLOW LENGTH(FEET) =   829.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  29.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.49
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     99.39
  PIPE TRAVEL TIME(MIN.) =   1.11    Tc(MIN.) =   8.30
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =  1916.00 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.181
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7532
  SUBAREA AREA(ACRES) =   7.17    SUBAREA RUNOFF(CFS) =21.28
  TOTAL AREA(ACRES) =     35.54   TOTAL RUNOFF(CFS) =  111.91
  TC(MIN.) =   8.30

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.30
  RAINFALL INTENSITY(INCH/HR) =   4.18
  TOTAL STREAM AREA(ACRES) =
  35.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    111.91

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    250.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    5.000
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.796
  SUBAREA RUNOFF(CFS) =      8.85
  TOTAL AREA(ACRES) =      2.15   TOTAL RUNOFF(CFS) =      8.85

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  374.00  DOWNSTREAM ELEVATION(FEET) =  358.00
  STREET LENGTH(FEET) =   276.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 50.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.010
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.71
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.52
  STREET FLOW TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =   5.91
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.203
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.00      SUBAREA RUNOFF(CFS) =    0.00
```

```
  TOTAL AREA(ACRES) =      2.15        PEAK FLOW RATE(CFS) =       8.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.71
  FLOW VELOCITY(FEET/SEC.) =  5.05   DEPTH*VELOCITY(FT*FT/SEC.) =   1.52
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    255.00 =  1105.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   358.00  DOWNSTREAM(FEET) =   327.50
  FLOW LENGTH(FEET) =   443.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.36
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.85
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   6.46
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    240.00 =  1548.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.912
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =     2.52   SUBAREA RUNOFF(CFS) =     8.79
  TOTAL AREA(ACRES) =      4.67   TOTAL RUNOFF(CFS) =   16.29
  TC(MIN.) =   6.46

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.46
  RAINFALL INTENSITY(INCH/HR) =   4.91
  TOTAL STREAM AREA(ACRES) =     4.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.29

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      111.91     8.30        4.181        35.54
      2       16.29     6.46        4.912         4.67

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      103.46     6.46       4.912
      2      125.78     8.30       4.181

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    125.78   Tc(MIN.) =    8.30
  TOTAL AREA(ACRES) =     40.21
```

```
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =  1916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.50  DOWNSTREAM(FEET) =   325.00
  FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  30.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =14.83
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    125.78
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   8.48
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    260.00 =  2076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   325.00  DOWNSTREAM(FEET) =   314.00
  FLOW LENGTH(FEET) =   428.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  26.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.99
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    125.78
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   8.87
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    155.00 =  2504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      125.78     8.87        4.004       40.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    155.00 =  2504.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1      244.47    20.41        2.340      137.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    155.00 =  4760.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc     INTENSITY
  NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
      1     232.07       8.87        4.004
      2     317.97      20.41        2.340

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    317.97   Tc(MIN.) =   20.41
  TOTAL AREA(ACRES) =      177.24

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.340
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7456
  SUBAREA AREA(ACRES) =     2.07   SUBAREA RUNOFF(CFS) =     2.23
  TOTAL AREA(ACRES) =    179.31   TOTAL RUNOFF(CFS) =  317.97
  TC(MIN.) =  20.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   314.00  DOWNSTREAM(FEET) =   179.00
  FLOW LENGTH(FEET) =  1533.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  29.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  36.01
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    317.97
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =  21.12
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    160.00 =  6293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    179.00  DOWNSTREAM(FEET) =    178.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    61.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =    7.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    317.97
  FLOW VELOCITY(FEET/SEC.) =  18.64   FLOW DEPTH(FEET) =   2.44
  TRAVEL TIME(MIN.) =   0.05   Tc(MIN.) =  21.18
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    165.00 =  6354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================
```

Total Proposed 50-Year, 6-hour flow to Otay River = 317.9 CFS
Tc = 21.18 min
Total Area = 179.3 acres

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, 08020                                             *
* PRELIMINARY PROPOSED HYDROLOGY                                         *
* Q100                                                                   *
 **************************************************************************

  FILE NAME: 8020P100.DAT
  TIME/DATE OF STUDY: 14:43 05/12/2011
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   50.0     40.0    0.010/0.020/0.050   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  1.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  22
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =    6.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.856
  SUBAREA RUNOFF(CFS) =     11.56
  TOTAL AREA(ACRES) =      2.78   TOTAL RUNOFF(CFS) =     11.56

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    105.00 IS CODE =  31
--------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   494.00  DOWNSTREAM(FEET) =   487.20
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =16.79
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.56
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   6.06
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    58.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   487.20  DOWNSTREAM(FEET) =   484.30
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =9.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.56
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   6.28
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   185.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.30  DOWNSTREAM(FEET) =   482.60
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =7.45
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.56
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   6.60
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =   325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   482.60  DOWNSTREAM(FEET) =   468.80
  FLOW LENGTH(FEET) =   433.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =10.72
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.56
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   7.27
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =   758.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.174
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
```

```
  SUBAREA AREA(ACRES) =     3.87   SUBAREA RUNOFF(CFS) =   14.22
  TOTAL AREA(ACRES) =       6.65   TOTAL RUNOFF(CFS) =   24.43
  TC(MIN.) =   7.27

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.80  DOWNSTREAM(FEET) =   464.60
  FLOW LENGTH(FEET) =   168.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =11.76
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     24.43
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   7.51
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =   926.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.068
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =   4.75    SUBAREA RUNOFF(CFS) =   17.09
  TOTAL AREA(ACRES) =     11.40   TOTAL RUNOFF(CFS) =   41.02
  TC(MIN.) =   7.51

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.068
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =   4.50    SUBAREA RUNOFF(CFS) =   16.19
  TOTAL AREA(ACRES) =     15.90   TOTAL RUNOFF(CFS) =   57.21
  TC(MIN.) =   7.51

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   464.60  DOWNSTREAM(FEET) =   415.00
  FLOW LENGTH(FEET) =   640.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =21.65
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     57.21
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   8.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =  1566.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.864
RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  92
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
SUBAREA AREA(ACRES) =   3.72    SUBAREA RUNOFF(CFS) =   12.85
TOTAL AREA(ACRES) =     19.62   TOTAL RUNOFF(CFS) =   67.76
TC(MIN.) =   8.00

****************************************************************************
FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   415.00  DOWNSTREAM(FEET) =   413.00
FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =18.50
ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     67.76
PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   8.04
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =  1612.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.848
RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  92
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
SUBAREA AREA(ACRES) =    6.69   SUBAREA RUNOFF(CFS) =   23.03
TOTAL AREA(ACRES) =     26.31   TOTAL RUNOFF(CFS) =   90.56
TC(MIN.) =   8.04

****************************************************************************
FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   413.00  DOWNSTREAM(FEET) =   386.00
FLOW LENGTH(FEET) =   371.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  24.06
ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     90.56
PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   8.30
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    140.00 =  1983.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.751
RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  92
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
SUBAREA AREA(ACRES) =    8.26   SUBAREA RUNOFF(CFS) =   27.86
TOTAL AREA(ACRES) =     34.57   TOTAL RUNOFF(CFS) =  116.60
TC(MIN.) =   8.30
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   386.00  DOWNSTREAM(FEET) =   382.50
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =20.79
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    116.60
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   8.37
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =  2066.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.726
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =    2.13   SUBAREA RUNOFF(CFS) =    7.15
  TOTAL AREA(ACRES) =     36.70   TOTAL RUNOFF(CFS) =  123.15
  TC(MIN.) =   8.37

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   382.50  DOWNSTREAM(FEET) =   372.00
  FLOW LENGTH(FEET) =    49.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  38.74
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    123.15
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   8.39
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =  2115.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.39
  RAINFALL INTENSITY(INCH/HR) =   4.72
  TOTAL STREAM AREA(ACRES) =    36.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    123.15

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .9210
  S.C.S. CURVE NUMBER (AMC II) =  92
  USER SPECIFIED Tc(MIN.) =   16.350
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.068
  SUBAREA RUNOFF(CFS) =     56.79
```

```
  TOTAL AREA(ACRES) =     20.10   TOTAL RUNOFF(CFS) =     56.79

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   511.04  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.49
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     56.79
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =  16.85
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =   520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.009
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9188
  SUBAREA AREA(ACRES) =    0.92   SUBAREA RUNOFF(CFS) =    2.41
  TOTAL AREA(ACRES) =     21.02   TOTAL RUNOFF(CFS) =   58.11
  TC(MIN.) =  16.85

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   488.00
  FLOW LENGTH(FEET) =    81.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.61
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     58.11
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  16.94
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =   601.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    315.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   488.00  DOWNSTREAM(FEET) =   457.00
  FLOW LENGTH(FEET) =   672.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.47
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     58.11
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =  17.54
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =  1273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.931
```

```
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8823
  SUBAREA AREA(ACRES) =   8.29    SUBAREA RUNOFF(CFS) =   19.20
  TOTAL AREA(ACRES) =     29.31   TOTAL RUNOFF(CFS) =   75.81
  TC(MIN.) =  17.54

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    320.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   457.00  DOWNSTREAM(FEET) =   436.50
  FLOW LENGTH(FEET) =   435.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =19.91
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     75.81
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  17.91
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  1708.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.893
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8691
  SUBAREA AREA(ACRES) =    4.92   SUBAREA RUNOFF(CFS) =   11.24
  TOTAL AREA(ACRES) =     34.23   TOTAL RUNOFF(CFS) =   86.05
  TC(MIN.) =  17.91

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.893
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8157
  SUBAREA AREA(ACRES) =    3.92   SUBAREA RUNOFF(CFS) =    3.97
  TOTAL AREA(ACRES) =     38.15   TOTAL RUNOFF(CFS) =   90.02
  TC(MIN.) =  17.91

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    325.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   436.50  DOWNSTREAM(FEET) =   419.50
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  21.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.74
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     90.02
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =  18.20
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    325.00 =  2068.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.863
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8202
 SUBAREA AREA(ACRES) =    3.41   SUBAREA RUNOFF(CFS) =    8.49
 TOTAL AREA(ACRES) =     41.56   TOTAL RUNOFF(CFS) =   97.59
 TC(MIN.) =  18.20

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.863
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8177
 SUBAREA AREA(ACRES) =    3.80   SUBAREA RUNOFF(CFS) =    8.59
 TOTAL AREA(ACRES) =     45.36   TOTAL RUNOFF(CFS) =  106.18
 TC(MIN.) =  18.20

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    330.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   419.50  DOWNSTREAM(FEET) =   414.00
 FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.96
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    106.18
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  18.31
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =  2207.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.851
 CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  78
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7503
 SUBAREA AREA(ACRES) =    7.63   SUBAREA RUNOFF(CFS) =    7.61
 TOTAL AREA(ACRES) =     52.99   TOTAL RUNOFF(CFS) =  113.36
 TC(MIN.) =  18.31

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    335.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   414.00  DOWNSTREAM(FEET) =   399.00
 FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  27.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.88
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =    113.36
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =  18.94
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    335.00 =  2837.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.790
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7562
  SUBAREA AREA(ACRES) =    2.76   SUBAREA RUNOFF(CFS) =    6.70
  TOTAL AREA(ACRES) =     55.75   TOTAL RUNOFF(CFS) =  117.65
  TC(MIN.) =  18.94

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.790
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7596
  SUBAREA AREA(ACRES) =    6.22   SUBAREA RUNOFF(CFS) =   13.71
  TOTAL AREA(ACRES) =     61.97   TOTAL RUNOFF(CFS) =  131.36
  TC(MIN.) =  18.94

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.790
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7641
  SUBAREA AREA(ACRES) =   10.70   SUBAREA RUNOFF(CFS) =   23.59
  TOTAL AREA(ACRES) =     72.67   TOTAL RUNOFF(CFS) =  154.95
  TC(MIN.) =  18.94

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    340.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   399.00  DOWNSTREAM(FEET) =   397.50
  FLOW LENGTH(FEET) =    79.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  33.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.69
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    154.95
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  19.01
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =  2916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.783
```

```
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7564
  SUBAREA AREA(ACRES) =   12.11   SUBAREA RUNOFF(CFS) =23.93
  TOTAL AREA(ACRES) =     84.78   TOTAL RUNOFF(CFS) =  178.46
  TC(MIN.) =  19.01

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    345.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   397.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =   458.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =17.70
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    178.46
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =  19.45
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    345.00 =  3374.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    345.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.743
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7609
  SUBAREA AREA(ACRES) =   13.28   SUBAREA RUNOFF(CFS) =   28.78
  TOTAL AREA(ACRES) =     98.06   TOTAL RUNOFF(CFS) =  204.67
  TC(MIN.) =  19.45

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    350.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.00  DOWNSTREAM(FEET) =   373.40
  FLOW LENGTH(FEET) =   419.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  29.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.77
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    204.67
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =  19.75
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =  3793.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.715
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7634
  SUBAREA AREA(ACRES) =    2.27   SUBAREA RUNOFF(CFS) =    5.36
  TOTAL AREA(ACRES) =    100.33   TOTAL RUNOFF(CFS) =  207.98
  TC(MIN.) =  19.75

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    350.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   373.40  DOWNSTREAM(FEET) =   372.00
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  34.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =19.56
 GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    207.98
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  19.80
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    150.00 =  3853.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  19.80
 RAINFALL INTENSITY(INCH/HR) =   2.71
 TOTAL STREAM AREA(ACRES) =   100.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    207.98

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      123.15     8.39        4.719         36.70
     2      207.98    19.80        2.711        100.33

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc     INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      211.23     8.39       4.719
     2      278.73    19.80       2.711

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    278.73   Tc(MIN.) =   19.80
 TOTAL AREA(ACRES) =    137.03
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    150.00 =  3853.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   372.00  DOWNSTREAM(FEET) =   314.00
 FLOW LENGTH(FEET) =   907.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  29.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  30.89
 GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    278.73
 PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =  20.29
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    155.00 =  4760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  10
----------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
======================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    210.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  USER SPECIFIED Tc(MIN.) =    6.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.856
  SUBAREA RUNOFF(CFS) =     34.00
  TOTAL AREA(ACRES) =      7.35   TOTAL RUNOFF(CFS) =     34.00

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.856
  NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    11.84   SUBAREA RUNOFF(CFS) =   54.78
  TOTAL AREA(ACRES) =     19.19   TOTAL RUNOFF(CFS) =   88.78
  TC(MIN.) =   6.00

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   369.00  DOWNSTREAM(FEET) =   357.00
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =23.50
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     88.78
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   6.12
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =   173.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   357.00  DOWNSTREAM(FEET) =   340.00
  FLOW LENGTH(FEET) =   596.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.09
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  30.00  NUMBER OF PIPES =  1
  PIPE-FLOW(CFS) =     88.78
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   6.67
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =   769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.469
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7690
  SUBAREA AREA(ACRES) =   6.82    SUBAREA RUNOFF(CFS) =26.48
  TOTAL AREA(ACRES) =     26.01   TOTAL RUNOFF(CFS) =  109.38
  TC(MIN.) =   6.67

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    225.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.00  DOWNSTREAM(FEET) =   339.00
  FLOW LENGTH(FEET) =   102.00    MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.47
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN  PIPE  DIAMETER(INCH) =  36.00   NUMBER  OF  PIPES =  1
  PIPE-FLOW(CFS) =    109.38
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   6.78
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    225.00 =   871.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    230.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.00  DOWNSTREAM(FEET) =   337.00
  FLOW LENGTH(FEET) =   216.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  33.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =11.68
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    109.38
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   7.09
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =  1087.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.258
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7641
  SUBAREA AREA(ACRES) =    2.36   SUBAREA RUNOFF(CFS) =    8.81
  TOTAL AREA(ACRES) =     28.37   TOTAL RUNOFF(CFS) =  113.99
  TC(MIN.) =   7.09

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   337.00  DOWNSTREAM(FEET) =   327.50
  FLOW LENGTH(FEET) =   829.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.84
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    113.99
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   8.17
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =  1916.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.800
 RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7532
 SUBAREA AREA(ACRES) =   7.17    SUBAREA RUNOFF(CFS) =24.44
 TOTAL AREA(ACRES) =     35.54   TOTAL RUNOFF(CFS) =  128.50
 TC(MIN.) =   8.17

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   8.17
 RAINFALL INTENSITY(INCH/HR) =   4.80
 TOTAL STREAM AREA(ACRES) =    35.54
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    128.50

****************************************************************************
 FLOW PROCESS FROM NODE    245.00 TO NODE    250.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  92
 USER SPECIFIED Tc(MIN.) =    5.000
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.587
 SUBAREA RUNOFF(CFS) =     10.05
 TOTAL AREA(ACRES) =      2.15   TOTAL RUNOFF(CFS) =     10.05

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  374.00  DOWNSTREAM ELEVATION(FEET) =  358.00
 STREET LENGTH(FEET) =   276.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 50.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.010
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.050
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.05
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.31
   HALFSTREET FLOOD WIDTH(FEET) =    9.24
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.18
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.61
 STREET FLOW TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =   5.89
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.927
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
 SUBAREA AREA(ACRES) =    0.00      SUBAREA RUNOFF(CFS) =    0.00
```

```
  TOTAL AREA(ACRES) =      2.15        PEAK FLOW RATE(CFS) =      10.05

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.24
  FLOW VELOCITY(FEET/SEC.) =  5.18   DEPTH*VELOCITY(FT*FT/SEC.) =   1.61
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    255.00 =  1105.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   358.00  DOWNSTREAM(FEET) =   327.50
  FLOW LENGTH(FEET) =   443.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.83
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.05
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   6.42
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    240.00 =  1548.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.605
  RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
  SUBAREA AREA(ACRES) =     2.52   SUBAREA RUNOFF(CFS) =   10.03
  TOTAL AREA(ACRES) =      4.67   TOTAL RUNOFF(CFS) =   18.58
  TC(MIN.) =   6.42

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.42
  RAINFALL INTENSITY(INCH/HR) =   5.60
  TOTAL STREAM AREA(ACRES) =     4.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.58

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1      128.50     8.17        4.800        35.54
      2       18.58     6.42        5.605         4.67

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      119.64     6.42       5.605
      2      144.41     8.17       4.800

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    144.41   Tc(MIN.) =    8.17
  TOTAL AREA(ACRES) =     40.21
```

```
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =  1916.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   327.50  DOWNSTREAM(FEET) =   325.00
 FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  33.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =15.21
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    144.41
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   8.34
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    260.00 =  2076.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    260.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   325.00  DOWNSTREAM(FEET) =   314.00
 FLOW LENGTH(FEET) =   428.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  28.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.58
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    144.41
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   8.73
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    155.00 =  2504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF     Tc      INTENSITY     AREA
 NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      144.41     8.73       4.599       40.21
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    155.00 =  2504.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF     Tc      INTENSITY     AREA
 NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      278.73    20.29       2.669      137.03
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    155.00 =  4760.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF        Tc     INTENSITY
 NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
     1     264.26       8.73        4.599
     2     362.52      20.29        2.669

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    362.52   Tc(MIN.) =   20.29
 TOTAL AREA(ACRES) =      177.24

****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7456
  SUBAREA AREA(ACRES) =    2.07   SUBAREA RUNOFF(CFS) =    2.54
  TOTAL AREA(ACRES) =    179.31   TOTAL RUNOFF(CFS) =  362.52
  TC(MIN.) =  20.29
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   314.00  DOWNSTREAM(FEET) =   179.00
  FLOW LENGTH(FEET) =  1533.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  37.12
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    362.52
  PIPE TRAVEL TIME(MIN.) =   0.69    Tc(MIN.) =  20.98
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    160.00 =  6293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    179.00  DOWNSTREAM(FEET) =    178.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    61.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =    7.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    362.52
  FLOW VELOCITY(FEET/SEC.) =  19.32   FLOW DEPTH(FEET) =   2.68
  TRAVEL TIME(MIN.) =   0.05   Tc(MIN.) =  21.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    165.00 =  6354.00 FEET.

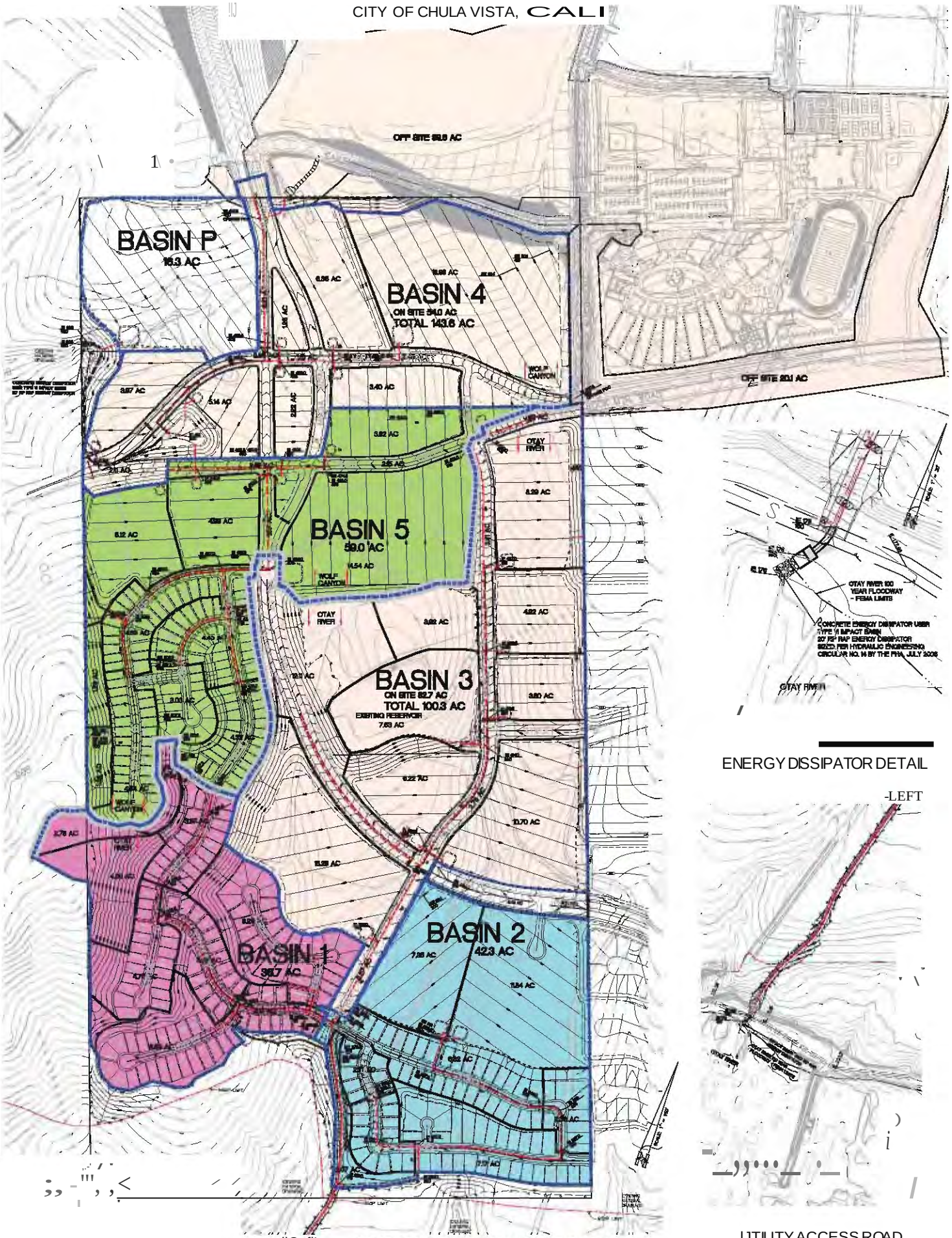
****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================
```

Total Proposed 100-Year, 6-hour flow to Otay River = 362.5 CFS
Tc = 21.03 min
Total Area = 179.3 acres

Appendix F

POST-PROJECT DRAINAGE OTAY RANCH, VILLAGE 8 WEST

CITY OF CHULA VISTA, CALI



ENERGY DISSIPATOR DETAIL

IJTILITY ACCESS ROAD

POST-PROJECT DRAINAGE PLAN

Appendix G

SECTION 3
Ri\TIONAL MET HOD AND MODIFIED RATIONAL METHOD

3.1 THE RATIONAL METHOD

The Rational Method (RM) is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. The RM is recommended for analyzing the runoff response from drainage areas up to approximately 1 square mile in size. It should not be used in instances where there is a junction of independent drainage systems or for drainage areas greater than approximately 1 square mile in size. In these instances, the Modified Rational Method (MRM) should be used for junctions of independent drainage systems in watersheds up to approximately 1 square mile in size (see Section 3.4); or the NRCS Hydrologic Method should be used for watersheds greater than approximately 1 square mile in size (see Section 4).

The RM can be applied using any design storm frequency (e.g., 100-year, 50-year, 10-year, etc.). The local agency determines the design storm frequency that must be used based on the type of project and specific local requirements. A discussion of design storm frequency is provided in Section 2.3 of this manual. A procedure has been developed that converts the 6-hour and 24-hour precipitation isopluvial map data to an Intensity-Duration curve that can be used for the rainfall intensity in the RM formula as shown in Figure 3-1. The RM is applicable to a 6-hour storm duration because the procedure uses Intensity-Duration Design Charts that are based on a 6-hour storm duration.

3.1.1 Rational Method Formula

The RM formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (Tc), which is the time required for water to

flow from the most remote point of the basin to the location being analyzed. The RM formula is expressed as follows:

$$Q = C\ I\ A$$

Where:
- Q peak discharge, in cubic feet per second (cfs)
- C runoff coefficient, proportion of the rainfall that runs off the surface (no units)
- I average rainfall intensity for a duration equal to the Tc for the area, in inches per hour (Note: If the computed Tc is less than 5 minutes, use 5 minutes for computing the peak discharge, Q)
- A drainage area contributing to the design location, in acres

Combining the units for the expression CIA yields:

$$\left(\frac{1 \text{ acre x inch}}{\text{hour}}\right)\left[\frac{43{,}560 \text{ ft}^2}{\text{acre}}\right]\left(\frac{1 \text{ foot}}{12 \text{ inches}}\right)\left(\frac{1 \text{ hour}}{3{,}600 \text{ seconds}}\right) \Rightarrow 1.008 \text{ cfs}$$

For practical purposes the unit conversion coefficient difference of 0.8% can be ignored.

The RM formula is based on the assumption that for constant rainfall intensity, the peak discharge rate at a point will occur when the raindrop that falls at the most upstream point in the tributary drainage basin arrives at the point of interest.

Unlike the MRM (discussed in Section 3.4) or the NRCS hydrologic method (discussed in Section 4), the RM does not create hydrographs and therefore does not add separate subarea hydrographs at collection points. Instead, the RM develops peak discharges in the main line by increasing the Tc as flow travels downstream.

Characteristics of, or assumptions inherent to, the RM are listed below:

- The discharge flow rate resulting from any I is maximum when the I lasts as long as or longer than the Tc·

- The storm frequency of peak discharges is the same as that of I for the given Tc.

- The fraction of rainfall that becomes runoff (or the runoff coefficient, C) is independent of I or precipitation zone number (PZN) condition (PZN Condition is discussed in Section 4.1.2.4).

- The peak rate of runoff is the only information produced by using the RM.

3.1.2 Runoff Coefficient

Table 3-1 lists the estimated runoff coefficients for urban areas. The concepts related to the runoff coefficient were evaluated in a report entitled *Evaluation, Rational]vf ethod* "C " *Values* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

The runoff coefficients are based on land use and soil type. Soil type can be determined from the soil type map provided in Appendix A. An appropriate runoff coefficient (C) for each type of land use in the subarea should be selected from this table and multiplied by the percentage of the total area (A) included in that class. The sum of the products for all land uses is the weighted runoff coefficient (L:[CA]). Good engineering judgment should be used when applying the values presented in Table 3-1, as adjustments to these values may be appropriate based on site-specific characteristics. In any event, the impervious percentage (% Impervious) as given in the table, for any area, shall govern the selected value for C. The runoff coefficient can also be calculated for an area based on soil type and impervious percentage using the following formula:

$$C = 0.90 \times (\% \text{ Impervious}) + Cp \times (1 - \% \text{ Impervious})$$

Where: Cp = Pervious Coefficient Runoff Value for the soil type (shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0% Impervious). Soil type can be determined from the soil type map provided in Appendix A.

The values in Table 3-1 are typical for most urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the local agency.

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use			Runoff Coefficient "C"			
			Soil Type			
NRCS Elements	Count Elements	%IJ\1PER.	A	B	C	D
Undisturbed Natural Terram (Natural)	Permanent Open Space	O*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1 0 DU/A or less	10	0 27	0.32	0 36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2 9 DU/A or less	25	0 38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0 66	0 67	0 69	0 71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N Com)	Neighborhood Commercial	80	0 76	0 77	0 78	0 79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I)	Limited Industrial	90	0 83	0.84	0.84	0.85
Commercial/Industnal (General I)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% lll1pervious may be used for direct calculation of the runoff coefficient as described m Section 3.1.2 (representing the perv10us runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).

DU/A = dwelling units per acre

NRCS = National Resources Conservation Service

3.1.3 Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr) for a duration equal to the Tc for a selected storm frequency. Once a particular storm frequency has been selected for design and a Tc calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration Design Chart (Figure 3-1). The 6-hour storm rainfall amount (P6) and the 24-hour storm rainfall amount (P_{24}) for the selected storm frequency are also needed for calculation of I. P6 and P_{24} can be read from the isopluvial maps provided in Appendix B. An Intensity-Duration Design Chart applicable to all areas within San Diego County is provided as Figure 3-1. Figure 3-2 provides an example of use of the Intensity-Duration Design Chart. Intensity can also be calculated using the following equation:

$$I = 7.44 \text{ p6 ff o 64s}$$

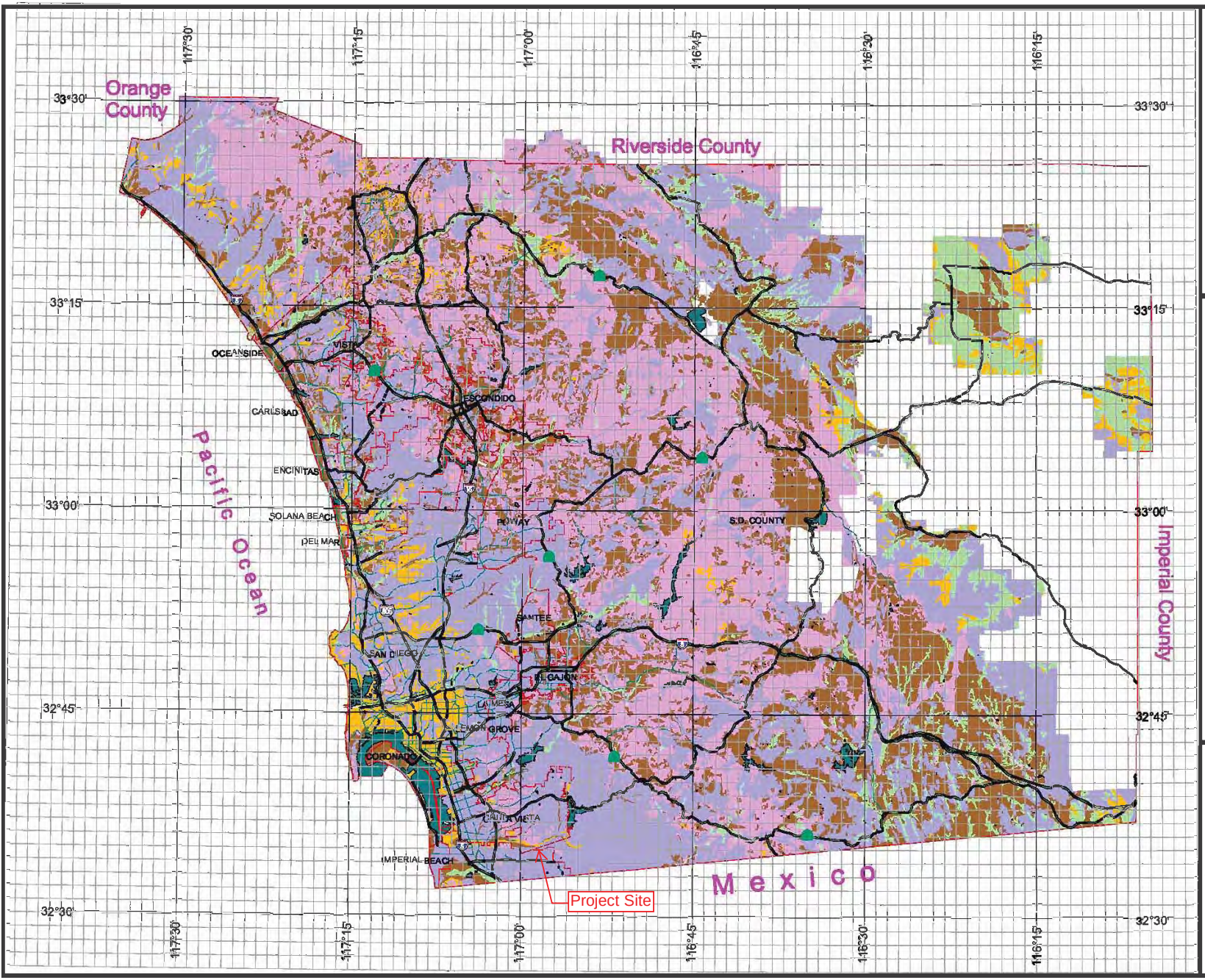
Where: adjusted 6-hour storm rainfall amount (see discussion below)
duration in minutes (use Tc)

Note: This equation applies only to the 6-hour storm rainfall amount (i.e., P_6 cannot be changed to P_{24} to calculate a 24-hour intensity using this equation).

The Intensity-Duration Design Chart and the equation are for the 6-hour storm rainfall amount. In general, P6 for the selected frequency should be between 45% and 65% of P_{24} for the selected frequency. If P6 is not within 45% to 65% of P_{24}, P6 should be increased or decreased as necessary to meet this criteria The isopluvial lines are based on precipitation gauge data At the time that the isopluvial lines were created, the majority of precipitation gauges in San Diego County were read daily, and these readings yielded 24-hour precipitation data. Some 6-hour data were available from the few recording gauges distributed throughout the County at that time; however, some 6-hour data were extrapolated. Therefore, the 24-hour precipitation data for San Diego County are considered to be more reliable.

County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

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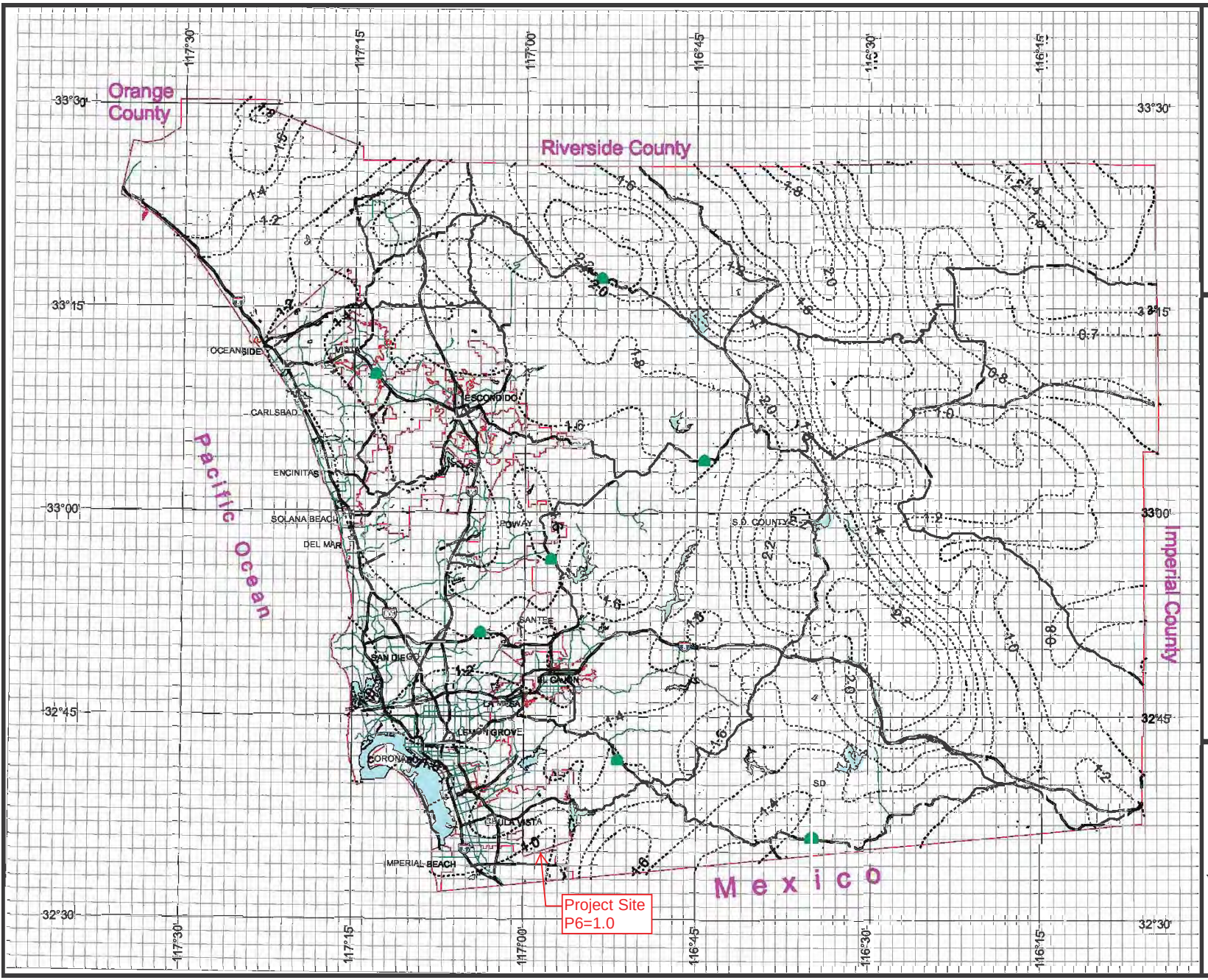
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County of San Diego Hydrology Manual

Rainfall Isopluvials

2 Year Rainfall Event - 6 Hours

Isopluvial (inches)

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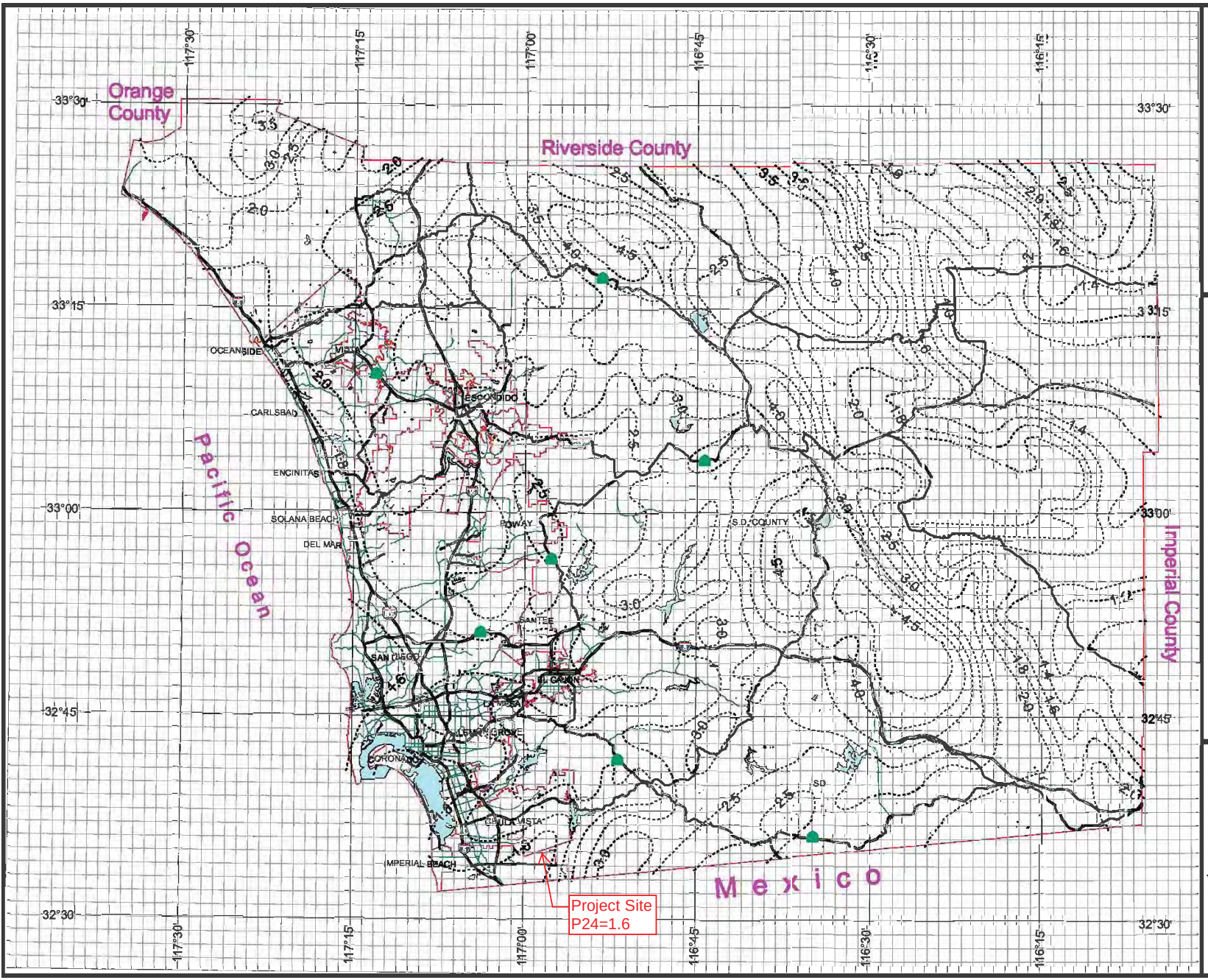
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County of San Diego Hydrology Manual

Rainfall Isopluvials

2 Year Rainfall Event - 24 Hours

Isopluvial (inches)



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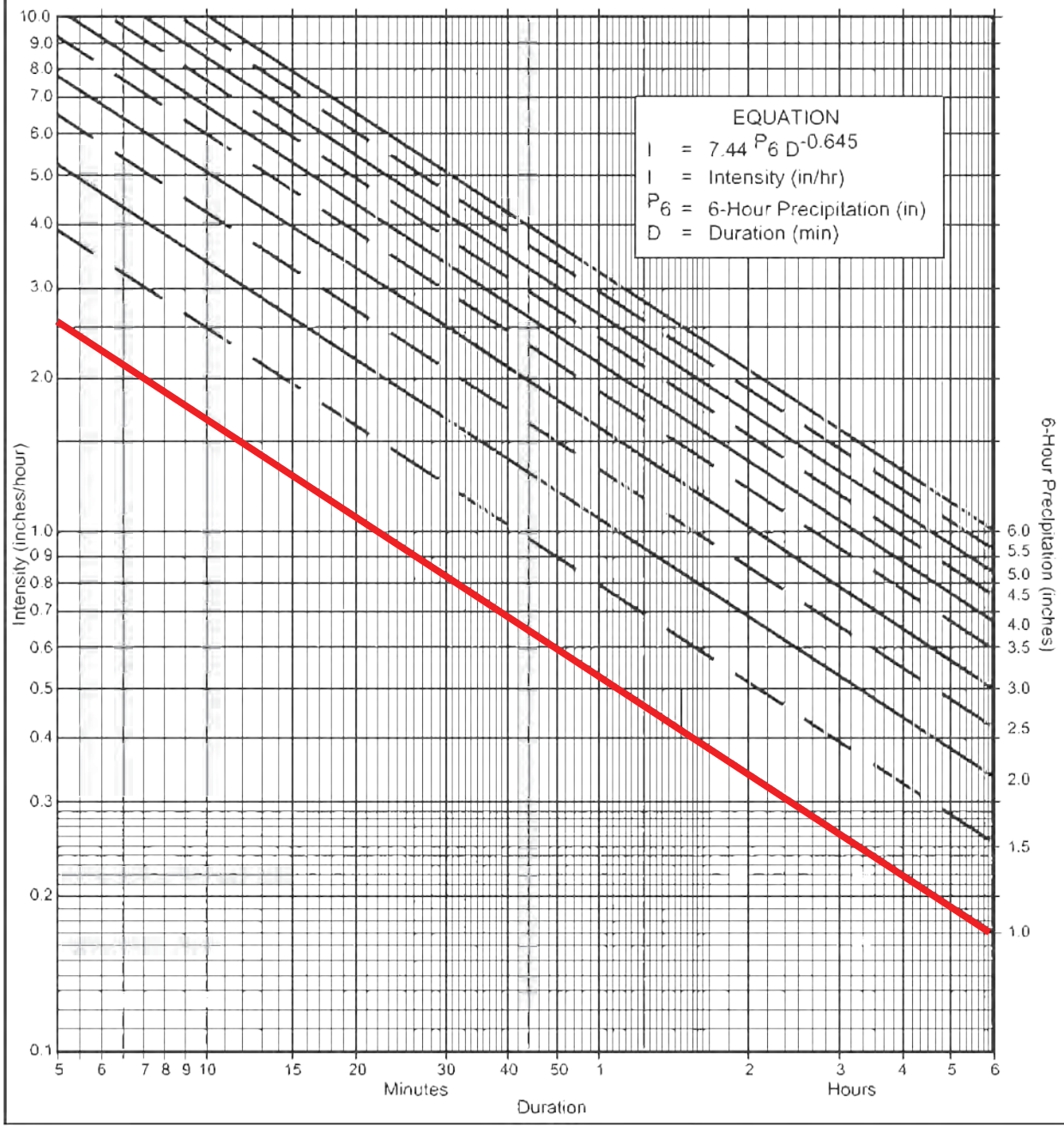
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Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 2 year

(b) P_6 = 1.0 in., P_{24} = 1.6, $\frac{P_6}{P_{24}}$ = 62.5 %(2)

(c) Adjusted $P_6^{(2)}$ = 1.0 in.

(d) t_x = 5 min. (min.)

(e) I = 2.63 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

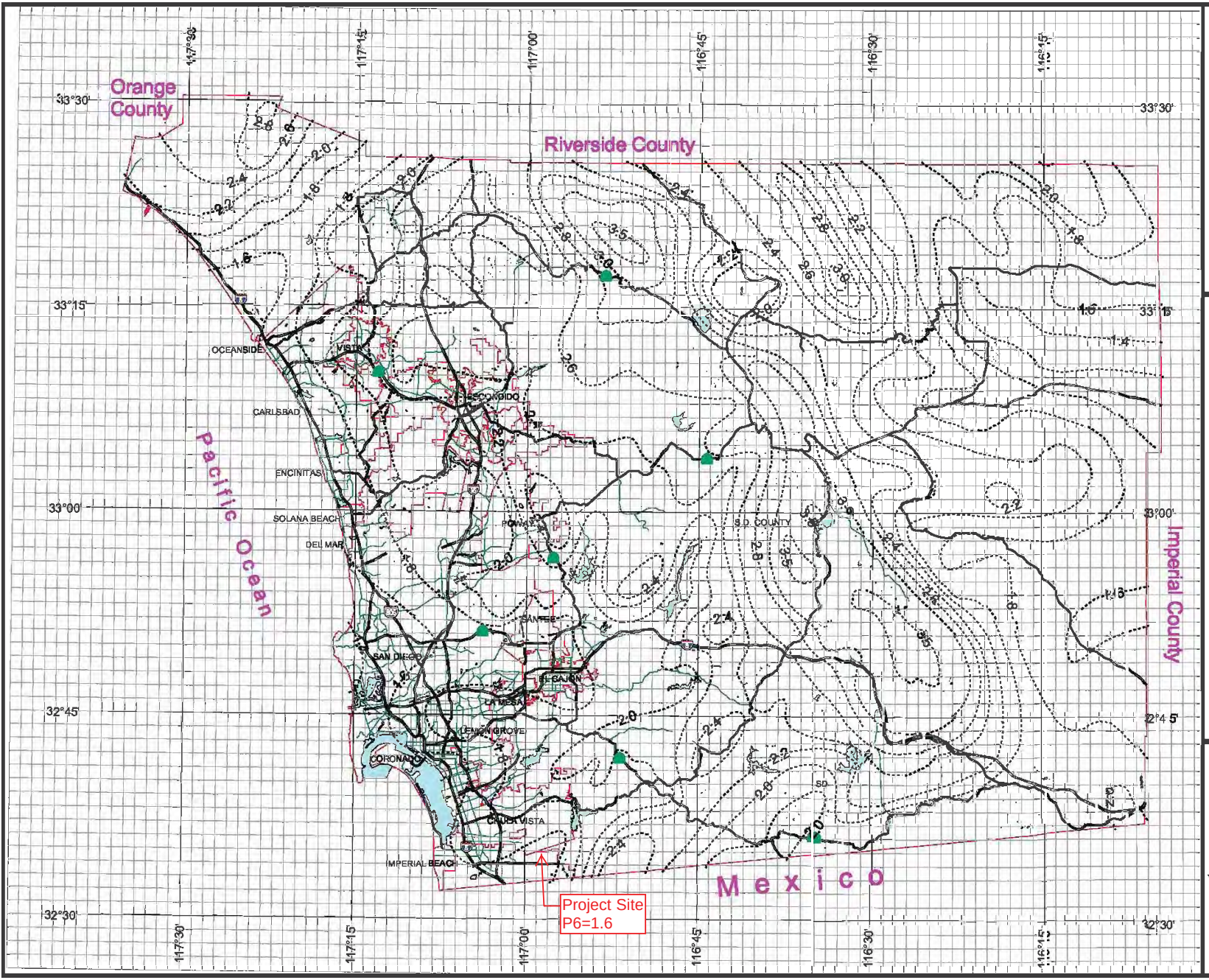
FIGURE 3-1

County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 6 Hours

Isopluvial (inches)



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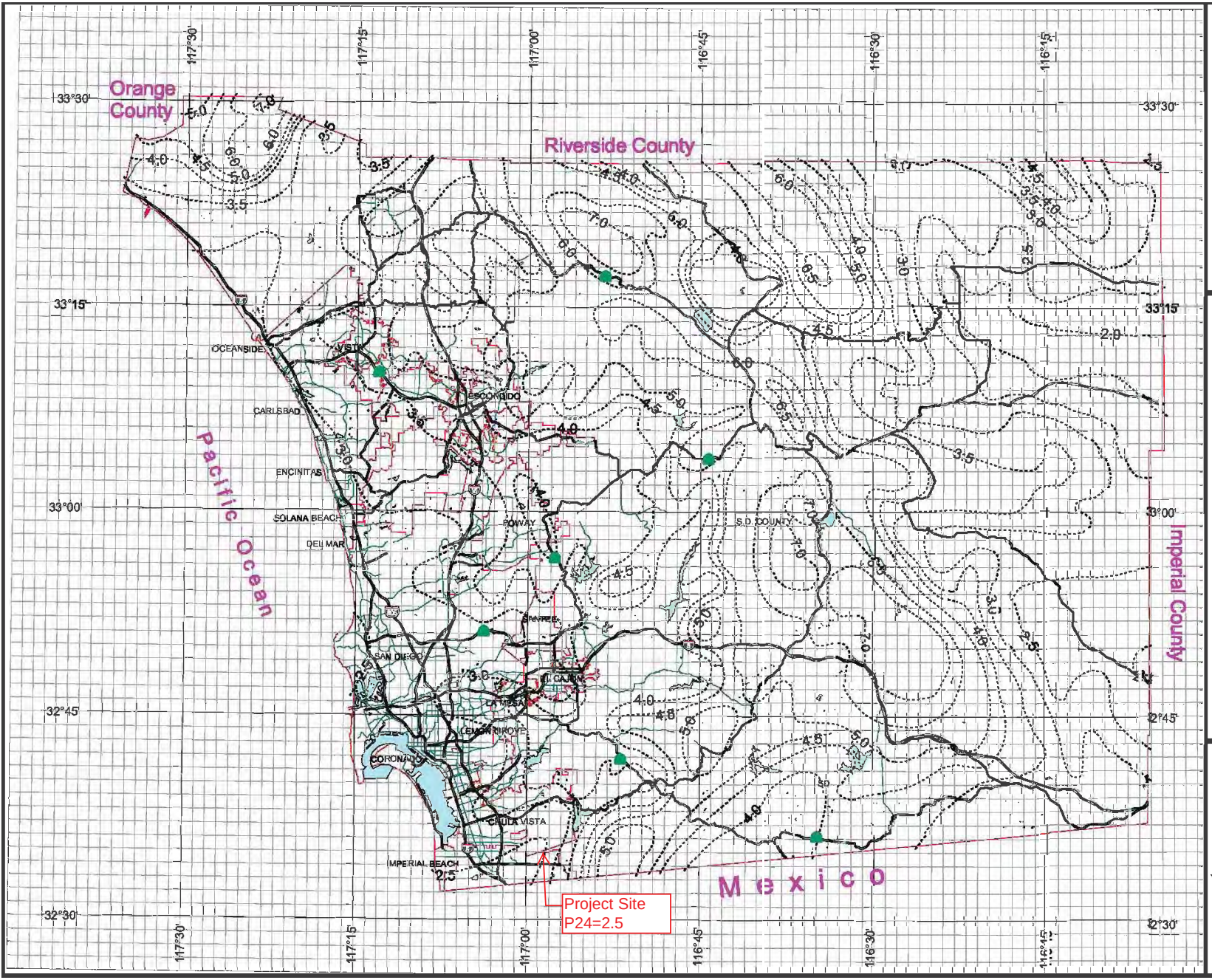
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County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 24 Hours

Isopluvial (inches)



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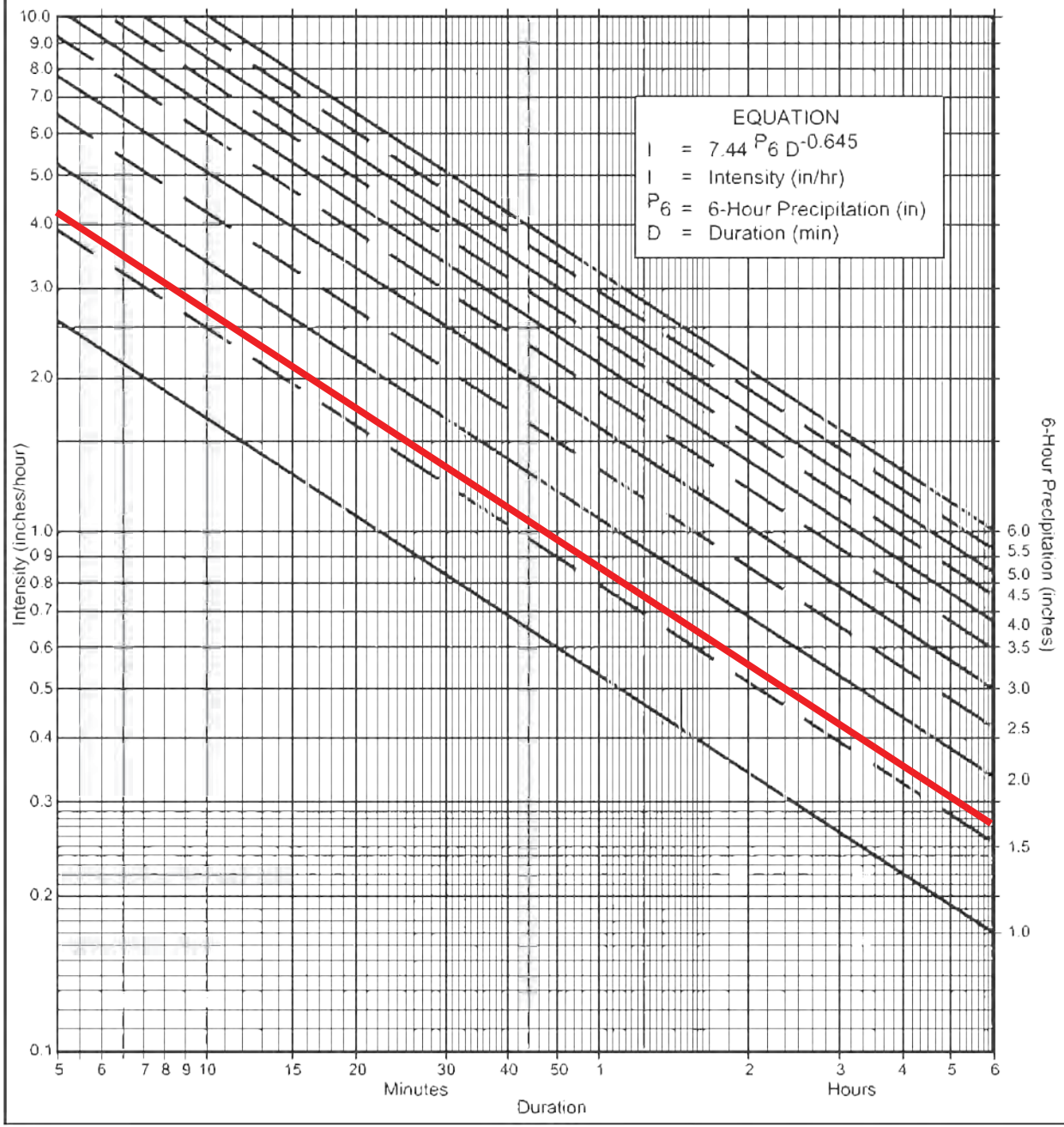
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Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 10 year

(b) P_6 = 1.6 in., P_{24} = 2.5, $\frac{P_6}{P_{24}}$ = 64.0 %(2)

(c) Adjusted P_6(2) = 1.6 in.

(d) t_x = 5 min. (min.)

(e) I = 4.21 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

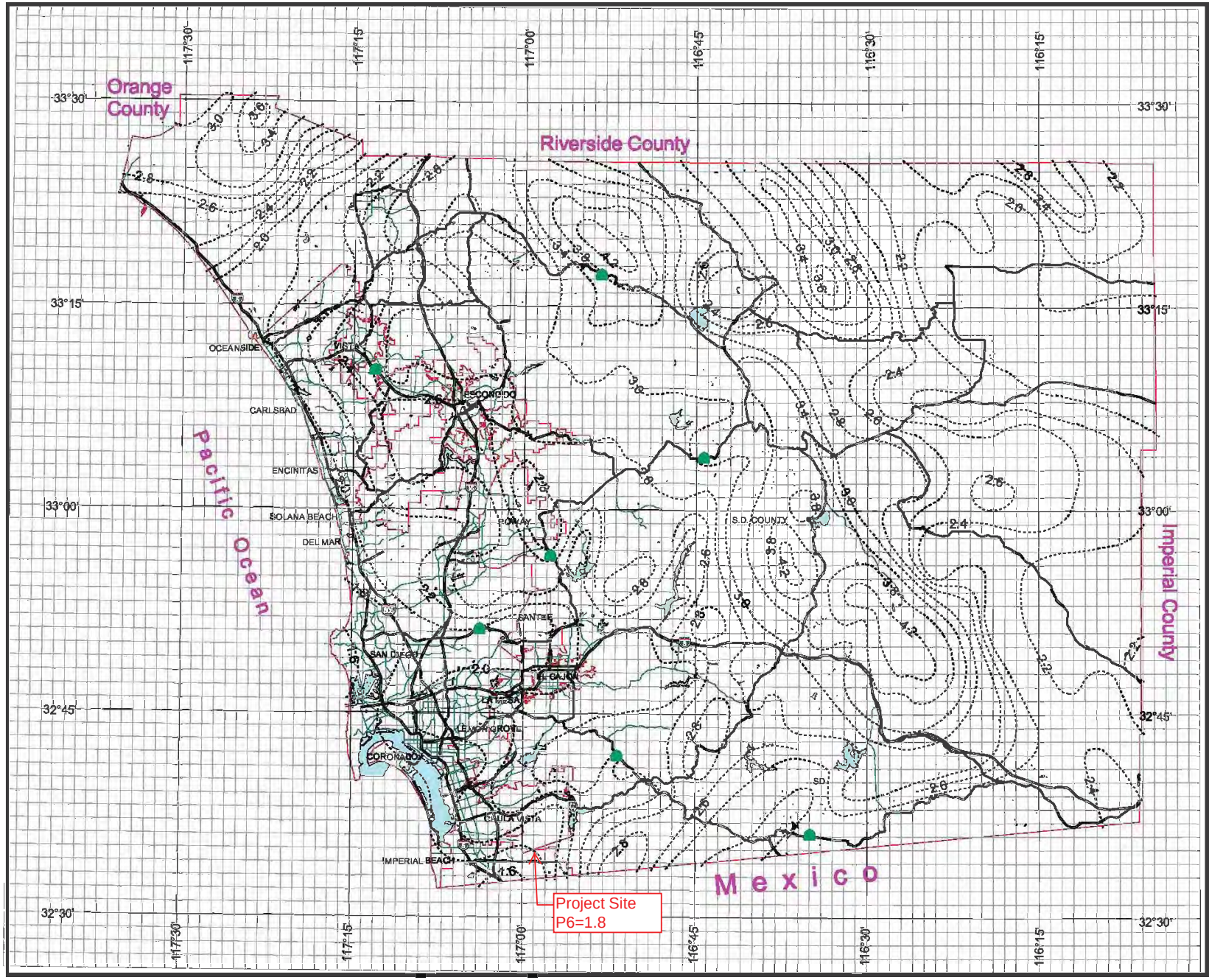
FIGURE 3-1

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Rainfall Isopluvials

25 Year Rainfall Event - 6 Hours

Isopluvial (inches)



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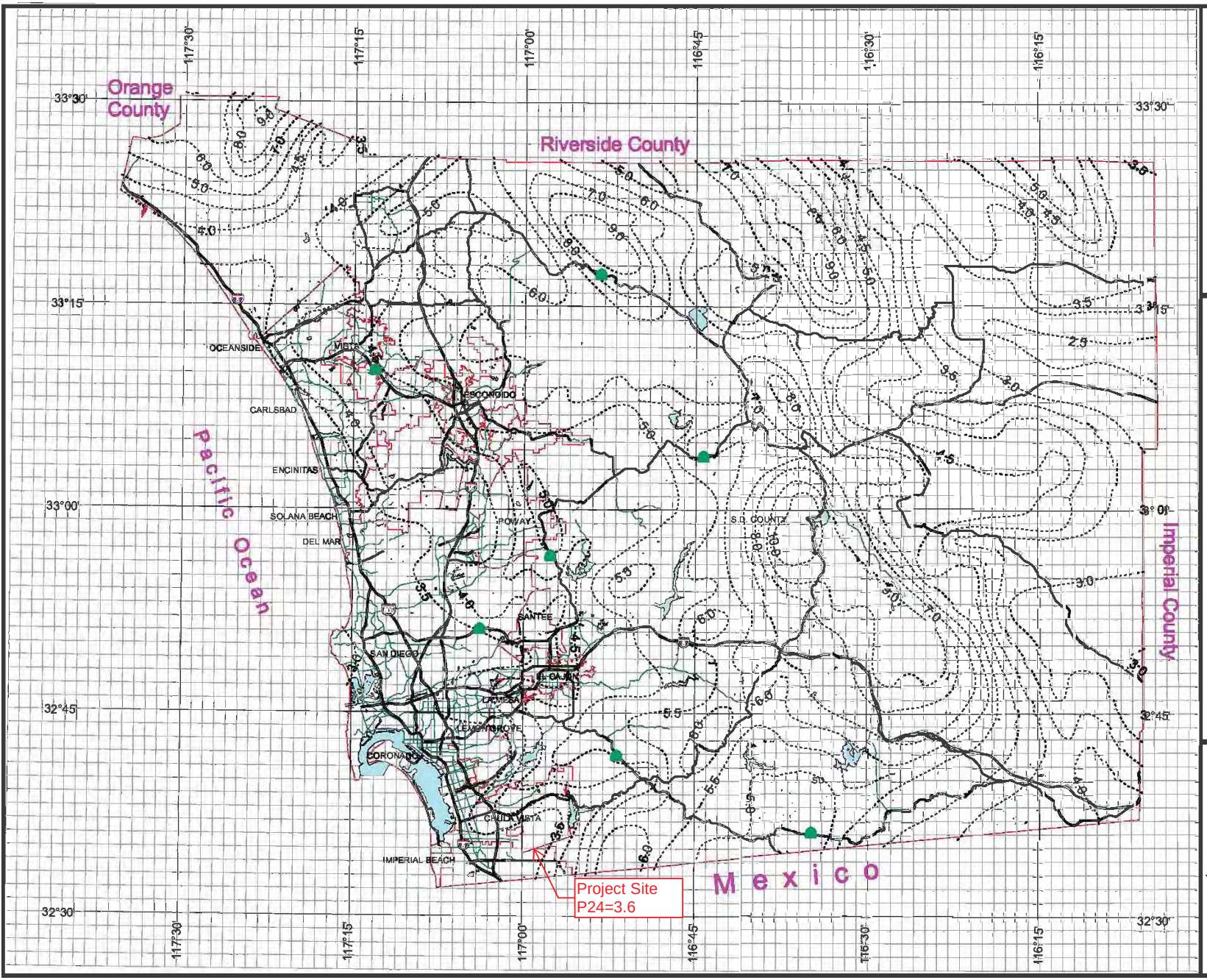
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County of San Diego Hydrology Manual

Rainfall Isopluvials

25 Year Rainfall Event - 24 Hours

Isopluvial (inches)



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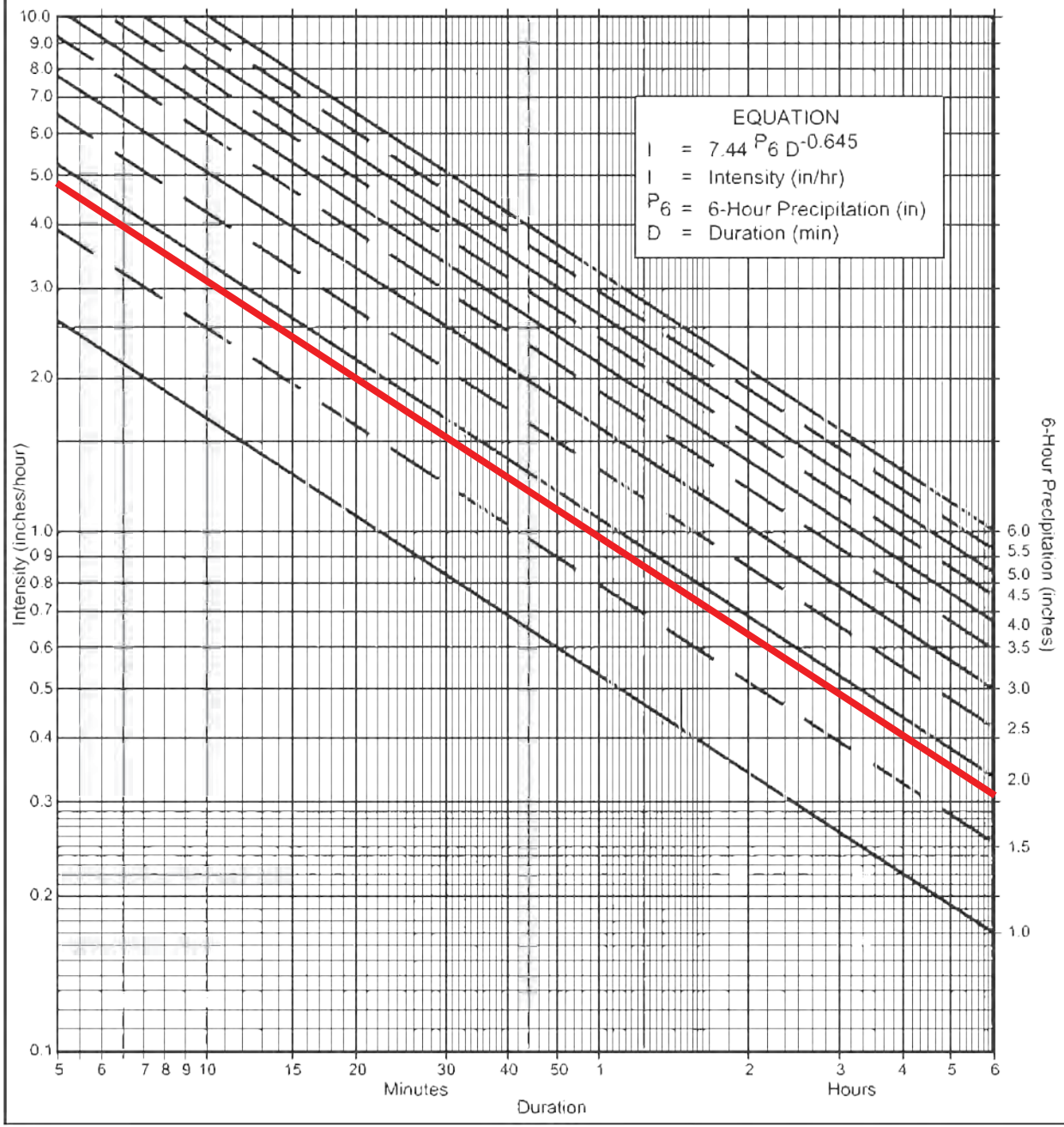
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Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 25 year

(b) P_6 = 1.8 in., P_{24} = 3.6, $\frac{P_6}{P_{24}}$ = 50.0 %(2)

(c) Adjusted $P_6^{(2)}$ = 1.8 in.

(d) t_x = 5 min.

(e) I = 4.74 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

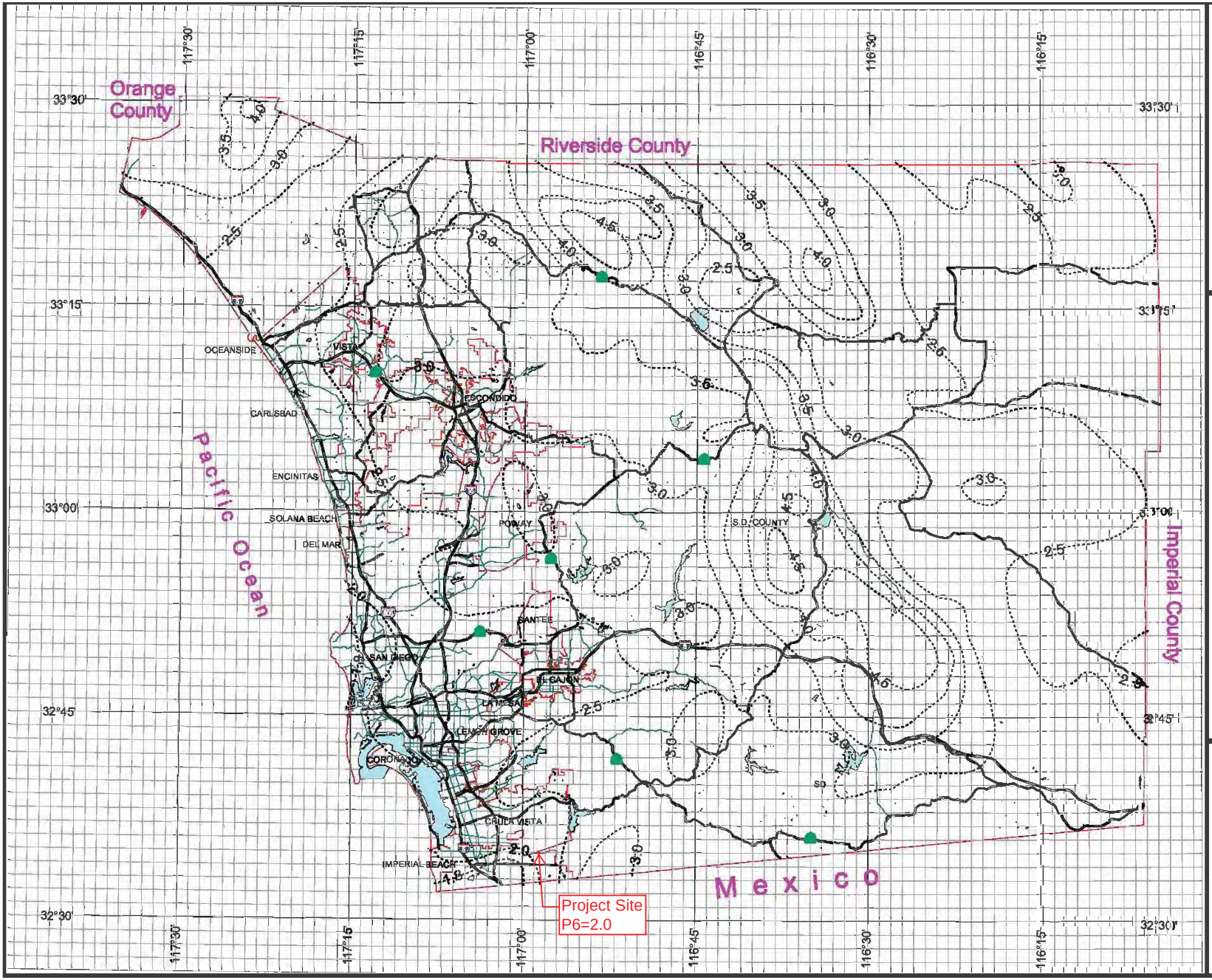
FIGURE 3-1

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Rainfall Isopluvials

50 Year Rainfall Event - 6 Hours

Isopluvial (inches)



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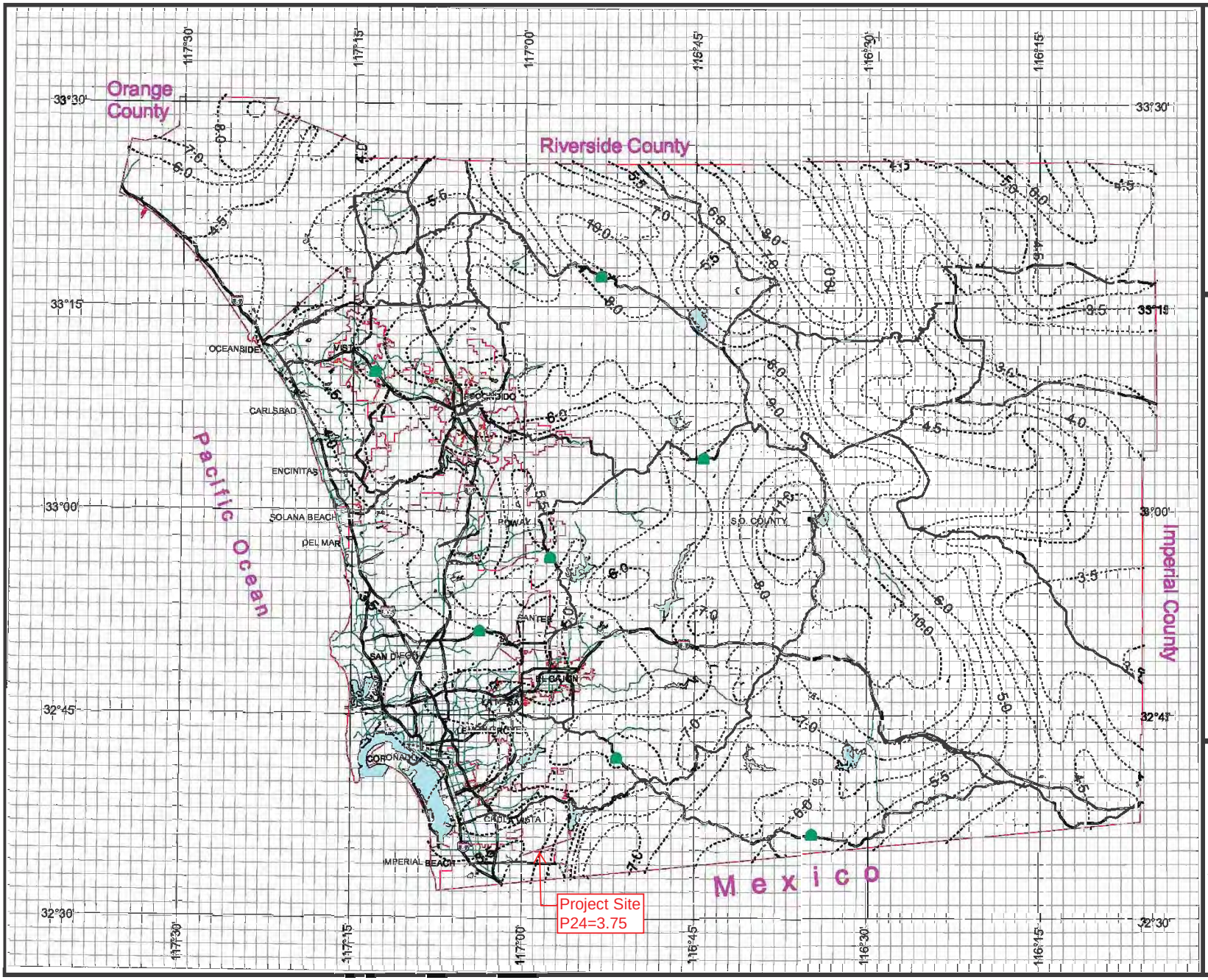
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County of San Diego Hydrology Manual

Rainfall Isopluvials



50 Year Rainfall Event - 24 Hours

Isopluvial (inches)

DPW GIS
Department of Public Works
Geographic Information Services

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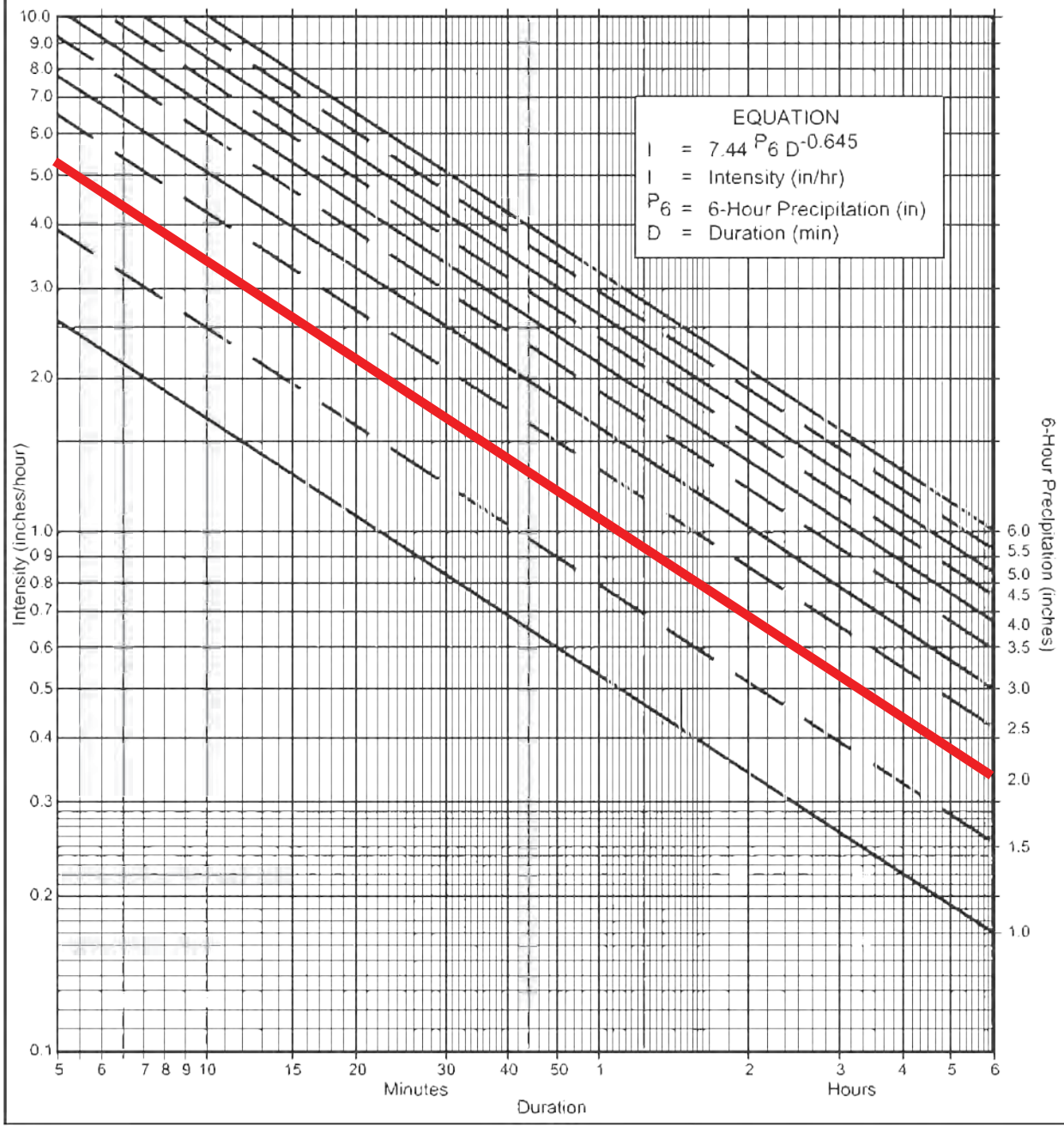
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Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 50 year

(b) P_6 = 2.0 in., P_{24} = 3.5, $\frac{P_6}{P_{24}}$ = 57.1 %(2)

(c) Adjusted $P_6^{(2)}$ = 2.0 in.

(d) t_x = 5 min. (max.)

(e) I = 5.27 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

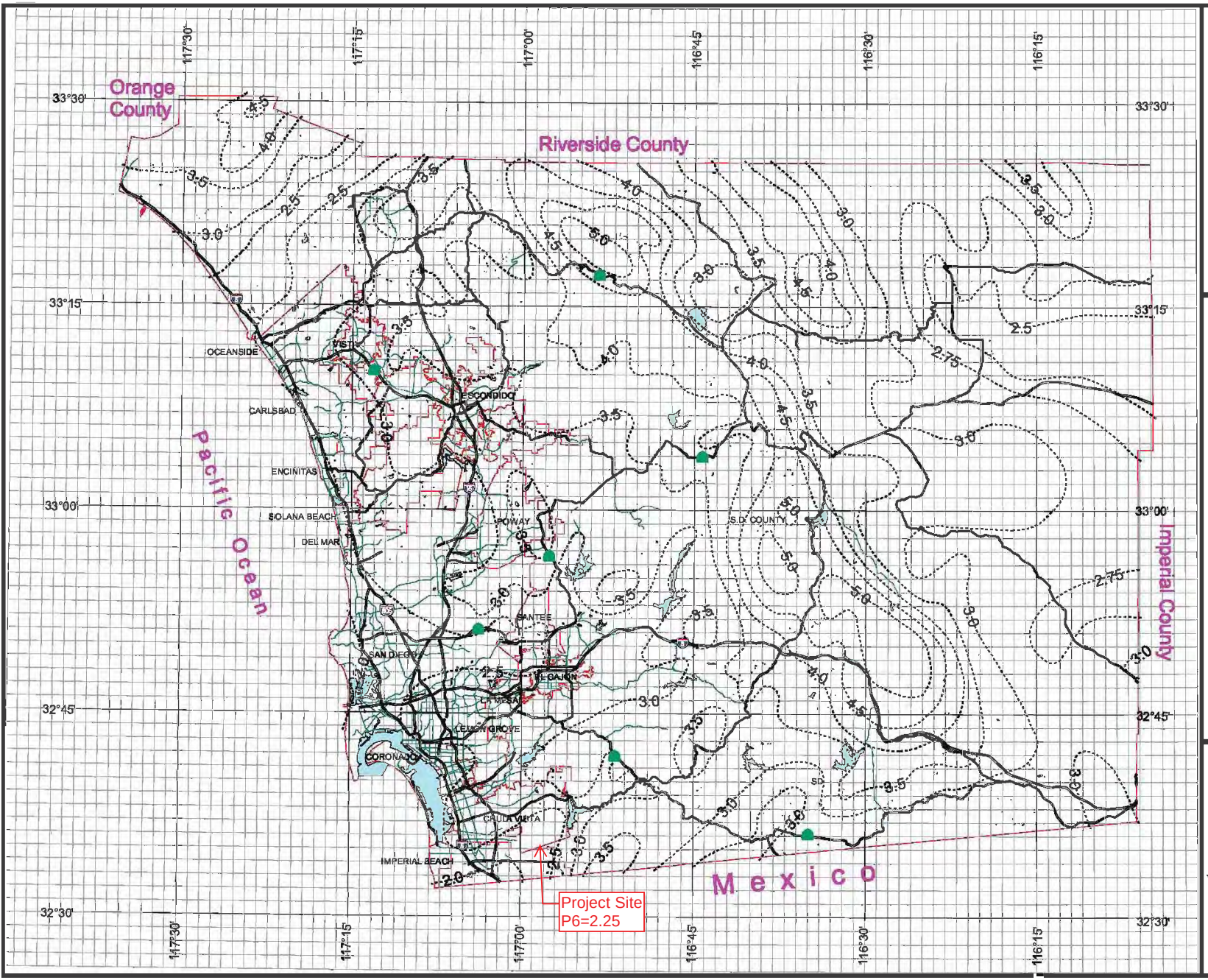
P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

County of San Diego Hydrology Manual

Rainfall Isopluvials



100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

DPW GIS
Department of Public Works
Geographic Information Services

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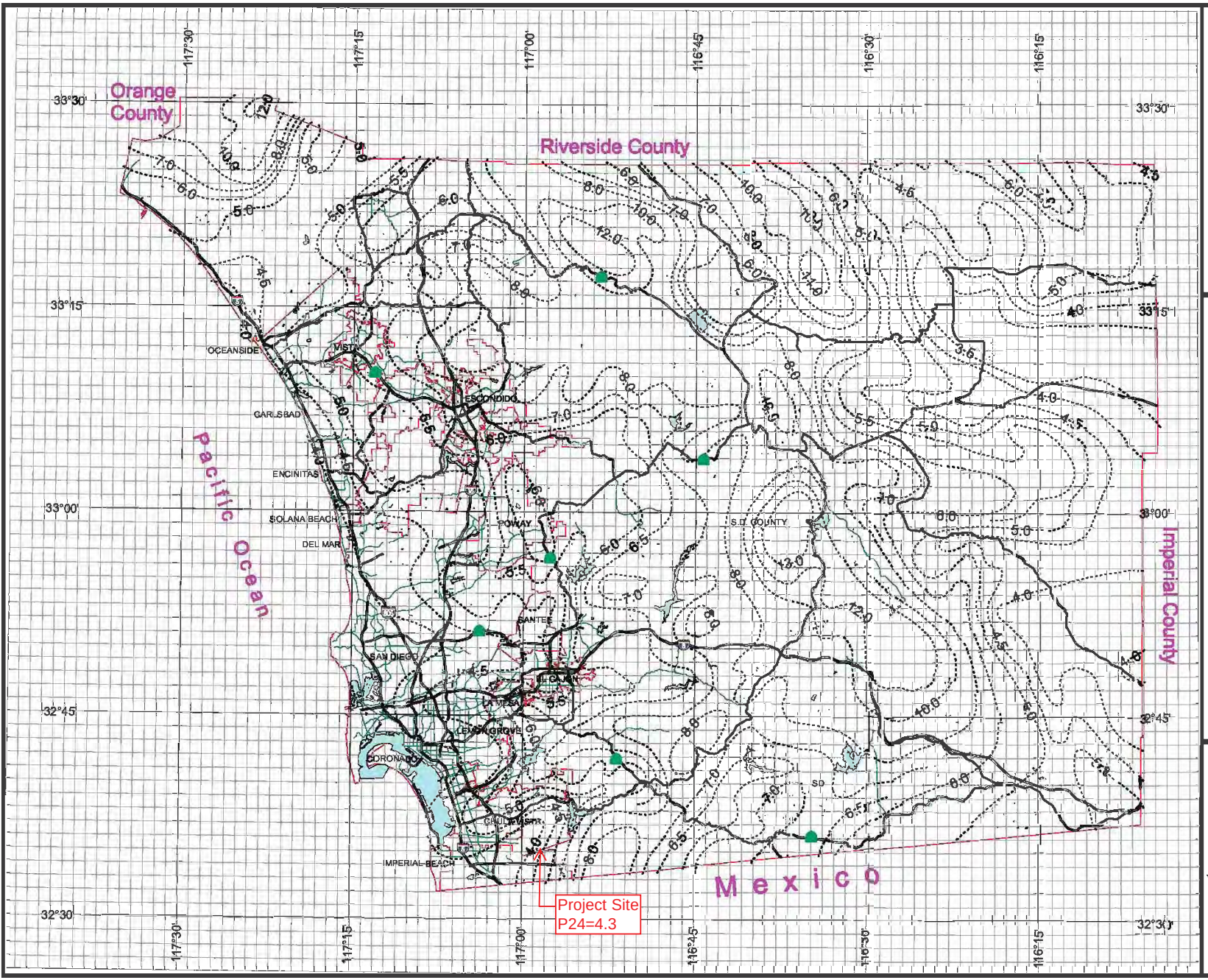
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County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

DPW GIS
Department of Public Works Geographic Information Services

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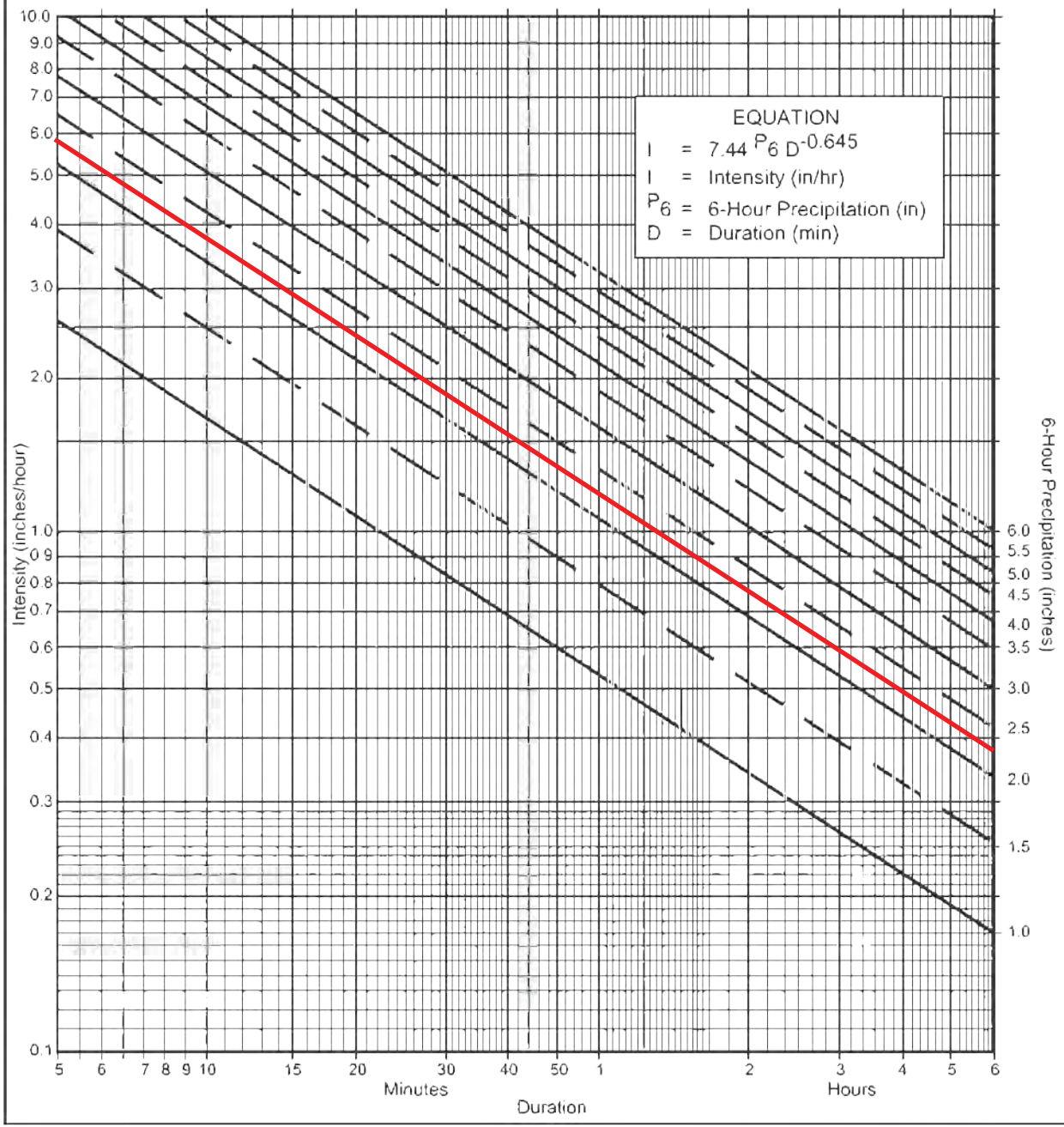
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Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 2.25 in., P_{24} = 4.25, $\frac{P_6}{P_{24}}$ = 52.9 %(2)

(c) Adjusted $P_6^{(2)}$ = 2.25 in.

(d) t_x = 5 min. (max.)

(e) I = 5.93 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

Preliminary Inlet Sizing

Per SDCDDM, July 2005

Gutter Flow per Section 2.3.1 of the San Diego County Drainage Design Manual

z1= 0.00
z2= 50.00
b= 0
n= 0.015

Roadway	Road Width (ft)	Max Width (ft)	y (ft)	A (sq ft)	P (ft)	R (ft)	Max Slope	Q (cfs)
Otay Valley Road	74	6	0.12	0.36	6.12	0.06	3.7%	1.04
OVR Couplet	43	5.6	0.112	0.31	5.71	0.05	3.4%	0.83
Main Couplet	46	5	0.1	0.25	5.10	0.05	5.9%	0.81
A Street	32	5.7	0.114	0.32	5.82	0.06	1.8%	0.63
A Street	58	5.1	0.102	0.26	5.20	0.05	5.0%	0.78
B Street	58	6.4	0.128	0.41	6.53	0.06	2.0%	0.91

Max Flow Per Linear Foot of Roadway

I= 2.25 (in/hr) for 100-year, 6-hr storm

Roadway	Perv. Length (ft)	Imperv. Length (ft)	Total Length (ft)	C	Q (cfs/ft)
Otay Valley Road	89	66	155.00	0.64	0.0052
OVR Couplet	48	54	102.00	0.69	0.0037
Main Couplet	43	65	108.00	0.72	0.0041
A Street	28	52	80.00	0.74	0.0031
A Street	37	66	103.00	0.74	0.0040
B Street	51	68	119.00	0.71	0.0044

Inlet Spacing per Section 2.3.2 of the San Diego County Drainage Design Manual

a= 0.17 ft max

Roadway	y (ft)	Lt (ft)	Q (cfs)	Max Inlet Spacing (ft)
Otay Valley Road	0.12	10	1.09	211.05
OVR Couplet	0.112	8	0.84	229.36
Main Couplet	0.1	9	0.88	217.99
A Street	0.114	6	0.64	205.47
A Street	0.102	8	0.79	200.56
B Street	0.128	8	0.91	207.85

Proposed Inet Sizing

Roadway	Inlet Type	Max. Spacing (ft)
Otay Valley Road	B1, L=11	200
OVR Couplet	B1, L=9	200
Main Couplet	B1, L=10	200
A Street	B1, L=7	200
A Street	B1, L=9	200
B Street	B1, L=9	200

***Note: All Inlet sizing is preliminary and subject to change**

50-Year Storm Event Dry Lane Calculations

For

Otay Valley Road

Given:

C = 0.64

I = 2.0 in/hr for a 6-hour storm

W = 37’ (1/2 roadway width) L

= 200’ (spacing of B inlets)

A = WxL = 7,400 ft^2

Q = CIA =

S_{max} = 0.037

Solving for spread width:

Given Input Data:

- Shape ..... Advanced
- Solving for ..... Depth of Flow
- Flowrate ..... 0.2200 cfs
- Slope ..... 0.0370 ft/ft
- Manning's n 0.0150
- Height ..... 6.0000 in
- Bottom width ..... 0.0000 in
- Left radius ..... 0.0000 in
- Right radius ..... 0.0000 in
- Left slope ..... 0.0833 ft/ft (V/H)
- Right slope ..... 1000.0000 ft/ft (V/H)

Computed Results:

- Depth ..... 1.3963 in
- Velocity ..... 2.7069 fps
- Full Flowrate ..... 10.7372 cfs
- Flow area ..... 0.0813 ft^2
- Flow perimeter ..... 18.2165 in
- Hydraulic radius ..... 0.6425 in
- **Top width ..... 16.7636 in**
- Area ..... 1.5007 ft^2
- Perimeter ..... 78.2783 in
- Percent full ..... 23.2715 %

Catch Basin Sizing

Per SDCDDM, July 2005

Depth of Flow In Open Channel

Given Input Data:

- Shape ..... Trapezoidal
- Solving for ..... Depth of Flow
- Flowrate ..... 15.6000 cfs
- Slope ..... 0.0370 ft/ft
- Manning's n 0.0250
- Height ..... 12.0000 in
- Bottom width ..... 60.0000 in
- Left slope ..... 4.0000 ft/ft (V/H)
- Right slope ..... 4.0000 ft/ft (V/H)

Computed Results:

- **Depth ..... 5.7796 in**
- Velocity ..... 6.3256 fps
- Full Flowrate ..... 49.2620 cfs
- Flow area 2.4662 ft2
- Flow perimeter ..... 71.9150 in
- Hydraulic radius ..... 4.9382 in
- Top width ..... 62.8898 in
- Area 5.2500 ft2
- Perimeter ..... 84.7386 in
- Percent full ..... 48.1634 %

Type F Catch Basin Sizing

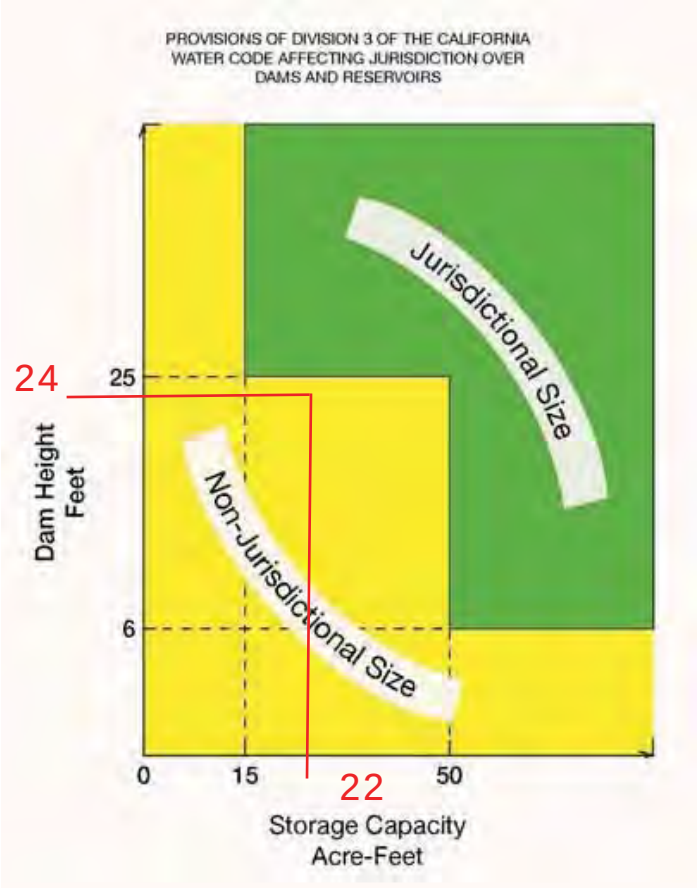
Catch Basin Sizing per Section 2.3.2 of the San Diego County Drainage Design Manual

Inlet Type	Cw	Co	L (ft)	W (ft)	d (ft)	Q Max (cfs)		Condition
						Weir	Orifice	
Curb Inlet (Type F)	3	0.67	3	NA	0.48	3.01	6.06	Weir
Grated Inlet (Type G)	3	0.67	3	6	0.48	9.02	33.58	Weir

* 3 Type F Catch Basins required for full interception. Note, Inlet sizing is preliminary and subject to change.

*2 triple Type G Catch Basins required for full interception. Note, Inlet sizing is preliminary and subject to change.

Division of Safety of Dams



DAM HEIGHT is measured from the downstream toe to the maximum storage elevation/spillway.

Specific exemptions from jurisdiction apply to:

OBSTRUCTIONS IN A CANAL to raise, lower or divert water there from; LEVEES, RAILROAD FILLS; ROAD or HIGHWAY FILLS; CIRCULAR TANKS; TANKS ELEVATED above the ground; certain NON-CIRCULAR TANKS in San Diego County; barriers OFF-STREAM for AGRICULTURAL USE or use as SEWAGE SLUDGE DRYING FACILITIES; OBSTRUCTIONS in channels or watercourses which are 15 feet or less in height, with single purpose of spreading water within the bed of the stream or watercourse upstream for percolation underground; WASTE WATER CONTROL FACILITY ponds, which are 15 feet or less in height, have a maximum storage capacity of 1500 acre-feet or less, are off-stream, and the operating public agency adopts certain resolutions; and FEDERAL DAMS.

For a complete text of exemptions, please refer to "Statutes and Regulations Pertaining to Supervision of Dams and Reservoirs", California Water Code, Division 3, Dams and Reservoirs, Part 1, Supervision of Dams and Reservoirs, Chapter 1, Definitions, 6000-6008.

440
430
410
400

AT BD

HEC-RAS Plan: Plan 02 River: Wolf Canyon Reach: Alignment -wolf

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment -wolf	600	EQ2	155.10	364.51	367.88	367.05	368.11	0.004110	3.88	39.94	22.43	0.51
Alignment -wolf	600	EQ10	245.30	364.51	368.51	367.58	368.82	0.004253	4.43	55.39	26.16	0.54
Alignment -wolf	600	EQ25	260.50	364.51	368.61	367.66	368.92	0.004270	4.50	57.83	26.70	0.54
Alignment -wolf	600	EQ50	321.40	364.51	368.95	367.95	369.30	0.004330	4.78	67.25	28.69	0.55
Alignment -wolf	600	EQ100	367.40	364.51	369.18	368.15	369.56	0.004370	4.96	74.04	30.05	0.56
Alignment -wolf	600	PQ2	59.30	364.51	366.86	366.25	367.00	0.003865	2.94	20.16	16.47	0.47
Alignment -wolf	600	PQ10	182.20	364.51	368.09	367.23	368.35	0.004152	4.06	44.83	23.67	0.52
Alignment -wolf	600	PQ25	204.40	364.51	368.25	367.36	368.52	0.004189	4.20	48.65	24.60	0.53
Alignment -wolf	600	PQ50	291.40	364.51	368.78	367.81	369.12	0.004303	4.65	62.67	27.74	0.55
Alignment -wolf	600	PQ100	367.10	364.51	369.18	368.14	369.56	0.004370	4.96	73.99	30.04	0.56
Alignment -wolf	596.54	EQ2	155.10	364.00	366.61	366.61	367.32	0.017556	6.75	22.99	16.68	1.01
Alignment -wolf	596.54	EQ10	245.30	364.00	367.17	367.17	368.02	0.016415	7.39	33.18	19.94	1.01
Alignment -wolf	596.54	EQ25	260.50	364.00	367.25	367.25	368.12	0.016294	7.49	34.80	20.41	1.01
Alignment -wolf	596.54	EQ50	321.40	364.00	367.54	367.54	368.49	0.015888	7.82	41.10	22.14	1.01
Alignment -wolf	596.54	EQ100	367.40	364.00	367.75	367.75	368.75	0.015608	8.03	45.73	23.34	1.01
Alignment -wolf	596.54	PQ2	59.30	364.00	365.74	365.74	366.22	0.019973	5.53	10.73	11.61	1.01
Alignment -wolf	596.54	PQ10	182.20	364.00	366.79	366.79	367.55	0.017185	6.97	26.12	17.75	1.01
Alignment -wolf	596.54	PQ25	204.40	364.00	366.93	366.93	367.72	0.016916	7.14	28.63	18.56	1.01
Alignment -wolf	596.54	PQ50	291.40	364.00	367.40	367.40	368.31	0.016063	7.66	38.04	21.32	1.01
Alignment -wolf	596.54	PQ100	367.10	364.00	367.75	367.75	368.75	0.015606	8.03	45.70	23.33	1.01
Alignment -wolf	583.22	EQ2	155.10	362.01	364.16	364.93	366.69	0.090153	12.78	12.13	11.29	2.17
Alignment -wolf	583.22	EQ10	245.30	362.01	364.65	365.52	367.42	0.074683	13.36	18.37	13.89	2.05
Alignment -wolf	583.22	EQ25	260.50	362.01	364.72	365.60	367.53	0.072859	13.43	19.39	14.28	2.03
Alignment -wolf	583.22	EQ50	321.40	362.01	364.99	365.91	367.91	0.066881	13.71	23.44	15.70	1.98
Alignment -wolf	583.22	EQ100	367.40	362.01	365.18	366.12	368.18	0.063397	13.89	26.44	16.67	1.94
Alignment -wolf	583.22	PQ2	59.30	362.01	363.40	363.99	365.50	0.133065	11.63	5.10	7.32	2.46
Alignment -wolf	583.22	PQ10	182.20	362.01	364.32	365.12	366.93	0.084304	12.98	14.04	12.15	2.13
Alignment -wolf	583.22	PQ25	204.40	362.01	364.44	365.27	367.11	0.080408	13.12	15.58	12.80	2.10
Alignment -wolf	583.22	PQ50	291.40	362.01	364.87	365.76	367.72	0.069412	13.57	21.48	15.03	2.00
Alignment -wolf	583.22	PQ100	367.10	362.01	365.18	366.12	368.18	0.063417	13.89	26.42	16.67	1.94
Alignment -wolf	569.63	EQ2	155.10	359.99	361.47	362.45	365.11	0.132658	15.31	10.13	9.54	2.62
Alignment -wolf	569.63	EQ10	245.30	359.99	361.94	363.11	366.06	0.110478	16.29	15.06	11.15	2.47
Alignment -wolf	569.63	EQ25	260.50	359.99	362.02	363.20	366.20	0.107697	16.41	15.88	11.39	2.45
Alignment -wolf	569.63	EQ50	321.40	359.99	362.29	363.57	366.67	0.098362	16.80	19.13	12.31	2.37
Alignment -wolf	569.63	EQ100	367.40	359.99	362.48	363.81	367.00	0.092892	17.05	21.55	12.96	2.33
Alignment -wolf	569.63	PQ2	59.30	359.99	360.82	361.46	363.36	0.179978	12.80	4.63	7.36	2.84
Alignment -wolf	569.63	PQ10	182.20	359.99	361.62	362.66	365.43	0.124614	15.67	11.63	10.06	2.57
Alignment -wolf	569.63	PQ25	204.40	359.99	361.74	362.83	365.68	0.119207	15.92	12.84	10.45	2.53

HEC-RAS Plan: Plan 02 River: Wolf Canyon Reach: Alignment -wolf (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment -wolf	569.63	PQ50	291.40	359.99	362.16	363.39	366.45	0.102746	16.62	17.53	11.87	2.41
Alignment -wolf	569.63	PQ100	367.10	359.99	362.48	363.81	366.99	0.092921	17.05	21.53	12.95	2.33
Alignment -wolf	548.65	EQ2	155.10	357.99	359.77	360.50	362.31	0.104891	12.79	12.12	13.02	2.34
Alignment -wolf	548.65	EQ10	245.30	357.99	360.08	361.03	363.52	0.112410	14.87	16.50	14.85	2.49
Alignment -wolf	548.65	EQ25	260.50	357.99	360.13	361.11	363.71	0.112830	15.18	17.16	14.98	2.50
Alignment -wolf	548.65	EQ50	321.40	357.99	360.30	361.42	364.39	0.111915	16.22	19.82	15.51	2.53
Alignment -wolf	548.65	EQ100	367.40	357.99	360.43	361.65	364.84	0.110677	16.87	21.78	15.88	2.54
Alignment -wolf	548.65	PQ2	59.30	357.99	359.28	359.68	360.56	0.080399	9.10	6.52	9.57	1.94
Alignment -wolf	548.65	PQ10	182.20	357.99	359.88	360.66	362.70	0.108489	13.49	13.51	13.74	2.40
Alignment -wolf	548.65	PQ25	204.40	357.99	359.95	360.80	363.00	0.111189	14.01	14.59	14.27	2.44
Alignment -wolf	548.65	PQ50	291.40	357.99	360.22	361.27	364.06	0.112451	15.73	18.52	15.25	2.52
Alignment -wolf	548.65	PQ100	367.10	357.99	360.43	361.65	364.84	0.110685	16.86	21.77	15.88	2.54
Alignment -wolf	527.3	EQ2	155.10	355.96	358.30	358.96	360.40	0.068184	11.62	13.35	11.53	1.90
Alignment -wolf	527.3	EQ10	245.30	355.96	358.72	359.58	361.42	0.070649	13.20	18.59	13.61	1.99
Alignment -wolf	527.3	EQ25	260.50	355.96	358.77	359.67	361.59	0.071518	13.46	19.36	13.89	2.01
Alignment -wolf	527.3	EQ50	321.40	355.96	358.98	359.99	362.20	0.074483	14.40	22.32	14.92	2.08
Alignment -wolf	527.3	EQ100	367.40	355.96	359.12	360.20	362.63	0.076395	15.03	24.44	15.62	2.12
Alignment -wolf	527.3	PQ2	59.30	355.96	357.58	358.01	358.93	0.071938	9.33	6.36	7.93	1.84
Alignment -wolf	527.3	PQ10	182.20	355.96	358.44	359.16	360.72	0.068521	12.11	15.04	12.24	1.93
Alignment -wolf	527.3	PQ25	204.40	355.96	358.55	359.33	360.97	0.068943	12.50	16.36	12.77	1.95
Alignment -wolf	527.3	PQ50	291.40	355.96	358.88	359.84	361.90	0.073076	13.95	20.88	14.43	2.04
Alignment -wolf	527.3	PQ100	367.10	355.96	359.12	360.20	362.62	0.076386	15.03	24.43	15.61	2.12
Alignment -wolf	500	EQ2	155.10	353.38	355.70	356.50	358.27	0.085218	12.88	12.04	10.38	2.11
Alignment -wolf	500	EQ10	245.30	353.38	356.15	357.13	359.30	0.082034	14.24	17.23	12.41	2.13
Alignment -wolf	500	EQ25	260.50	353.38	356.22	357.22	359.46	0.081861	14.44	18.04	12.70	2.14
Alignment -wolf	500	EQ50	321.40	353.38	356.45	357.56	360.03	0.081346	15.18	21.17	13.76	2.16
Alignment -wolf	500	EQ100	367.40	353.38	356.61	357.79	360.45	0.081641	15.72	23.37	14.47	2.18
Alignment -wolf	500	PQ2	59.30	353.38	354.97	355.50	356.67	0.093228	10.47	5.66	7.12	2.07
Alignment -wolf	500	PQ10	182.20	353.38	355.85	356.69	358.61	0.083900	13.33	13.67	11.06	2.11
Alignment -wolf	500	PQ25	204.40	353.38	355.96	356.87	358.86	0.083037	13.66	14.96	11.57	2.12
Alignment -wolf	500	PQ50	291.40	353.38	356.34	357.40	359.76	0.081642	14.84	19.64	13.25	2.15
Alignment -wolf	500	PQ100	367.10	353.38	356.61	357.79	360.44	0.081639	15.71	23.36	14.46	2.18
Alignment -wolf	485.49	EQ2	155.10	351.99	355.23	355.23	356.04	0.017630	7.23	21.44	13.24	1.00
Alignment -wolf	485.49	EQ10	245.30	351.99	355.88	355.88	356.86	0.016670	7.94	30.88	15.89	1.00
Alignment -wolf	485.49	EQ25	260.50	351.99	355.96	355.98	356.98	0.016717	8.07	32.27	16.24	1.01
Alignment -wolf	485.49	EQ50	321.40	351.99	356.31	356.33	357.41	0.016373	8.44	38.09	17.66	1.01
Alignment -wolf	485.49	EQ100	367.40	351.99	356.55	356.57	357.71	0.016066	8.66	42.43	18.66	1.01

100' FROM BD

HEC-RAS Plan: Plan 02 River: Wolf Canyon Reach: Alignment -wolf (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment -wolf	485.49	PQ2	59.30	351.99	354.18	354.18	354.75	0.020617	6.03	9.83	8.96	1.01
Alignment -wolf	485.49	PQ10	182.20	351.99	355.44	355.44	356.31	0.017274	7.47	24.38	14.12	1.00
Alignment -wolf	485.49	PQ25	204.40	351.99	355.59	355.59	356.52	0.017345	7.70	26.54	14.73	1.01
Alignment -wolf	485.49	PQ50	291.40	351.99	356.16	356.16	357.21	0.016284	8.22	35.46	17.03	1.00
Alignment -wolf	485.49	PQ100	367.10	351.99	356.55	356.56	357.71	0.016069	8.66	42.40	18.65	1.01
Alignment -wolf	462.34	EQ2	155.10	349.88	351.56	352.52	354.94	0.115437	14.74	10.53	9.32	2.44
Alignment -wolf	462.34	EQ10	245.30	349.88	352.08	353.21	355.82	0.095631	15.51	15.81	11.16	2.30
Alignment -wolf	462.34	EQ25	260.50	349.88	352.16	353.30	355.94	0.093312	15.61	16.68	11.43	2.28
Alignment -wolf	462.34	EQ50	321.40	349.88	352.44	353.66	356.41	0.085833	15.98	20.11	12.45	2.22
Alignment -wolf	462.34	EQ100	367.40	349.88	352.64	353.90	356.72	0.081849	16.19	22.69	13.30	2.18
Alignment -wolf	462.34	PQ2	59.30	349.88	350.82	351.50	353.48	0.177194	13.09	4.53	6.76	2.82
Alignment -wolf	462.34	PQ10	182.20	349.88	351.73	352.74	355.23	0.108042	15.01	12.14	9.91	2.39
Alignment -wolf	462.34	PQ25	204.40	349.88	351.86	352.92	355.44	0.102670	15.18	13.46	10.38	2.35
Alignment -wolf	462.34	PQ50	291.40	349.88	352.31	353.49	356.19	0.089198	15.81	18.43	11.96	2.24
Alignment -wolf	462.34	PQ100	367.10	349.88	352.64	353.90	356.71	0.081871	16.19	22.67	13.29	2.18
Alignment -wolf	421.94	EQ2	155.10	347.99	350.63	351.01	351.92	0.035856	9.13	16.99	13.00	1.41
Alignment -wolf	421.94	EQ10	245.30	347.99	351.05	351.62	352.83	0.040480	10.69	22.94	15.17	1.53
Alignment -wolf	421.94	EQ25	260.50	347.99	351.11	351.71	352.96	0.041106	10.91	23.87	15.50	1.55
Alignment -wolf	421.94	EQ50	321.40	347.99	351.34	352.02	353.46	0.043135	11.69	27.50	16.70	1.61
Alignment -wolf	421.94	EQ100	367.40	347.99	351.49	352.25	353.81	0.044628	12.23	30.04	17.50	1.65
Alignment -wolf	421.94	PQ2	59.30	347.99	349.93	350.04	350.59	0.027417	6.50	9.12	9.47	1.17
Alignment -wolf	421.94	PQ10	182.20	347.99	350.77	351.21	352.22	0.037419	9.65	18.87	13.71	1.45
Alignment -wolf	421.94	PQ25	204.40	347.99	350.87	351.37	352.45	0.038695	10.06	20.32	14.23	1.48
Alignment -wolf	421.94	PQ50	291.40	347.99	351.23	351.86	353.23	0.042473	11.35	25.67	16.11	1.58
Alignment -wolf	421.94	PQ100	367.10	347.99	351.49	352.24	353.81	0.044625	12.23	30.02	17.50	1.64
Alignment -wolf	400	EQ2	155.10	346.99	348.98	349.57	350.83	0.064256	10.92	14.21	13.30	1.86
Alignment -wolf	400	EQ10	245.30	346.99	349.40	350.14	351.69	0.062351	12.15	20.19	15.72	1.89
Alignment -wolf	400	EQ25	260.50	346.99	349.46	350.22	351.81	0.062196	12.33	21.14	16.06	1.89
Alignment -wolf	400	EQ50	321.40	346.99	349.67	350.52	352.29	0.061821	12.98	24.77	17.34	1.91
Alignment -wolf	400	EQ100	367.40	346.99	349.82	350.72	352.62	0.061815	13.43	27.37	18.19	1.93
Alignment -wolf	400	PQ2	59.30	346.99	348.31	348.71	349.58	0.077051	9.06	6.55	9.33	1.91
Alignment -wolf	400	PQ10	182.20	346.99	349.12	349.75	351.11	0.063500	11.33	16.08	14.10	1.87
Alignment -wolf	400	PQ25	204.40	346.99	349.22	349.90	351.32	0.062909	11.63	17.57	14.71	1.88
Alignment -wolf	400	PQ50	291.40	346.99	349.57	350.37	352.06	0.062052	12.67	22.99	16.73	1.90
Alignment -wolf	400	PQ100	367.10	346.99	349.82	350.72	352.62	0.061818	13.42	27.35	18.19	1.93
Alignment -wolf	379.47	EQ2	155.10	346.01	348.51	348.51	349.15	0.017813	6.43	24.12	19.31	1.01
Alignment -wolf	379.47	EQ10	245.30	346.01	349.02	349.02	349.78	0.016326	6.98	35.14	23.31	1.00

200' FROM BD

HEC-RAS Plan: Plan 02 River: Wolf Canyon Reach: Alignment -wolf (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment -wolf	379.47	EQ25	260.50	346.01	349.10	349.10	349.87	0.016179	7.06	36.89	23.88	1.00
Alignment -wolf	379.47	EQ50	321.40	346.01	349.37	349.37	350.21	0.015731	7.36	43.64	25.98	1.00
Alignment -wolf	379.47	EQ100	367.40	346.01	349.54	349.55	350.44	0.015707	7.61	48.28	27.32	1.01
Alignment -wolf	379.47	PQ2	59.30	346.01	347.71	347.71	348.15	0.020274	5.31	11.17	13.14	1.01
Alignment -wolf	379.47	PQ10	182.20	346.01	348.69	348.69	349.36	0.016966	6.57	27.72	20.70	1.00
Alignment -wolf	379.47	PQ25	204.40	346.01	348.81	348.81	349.52	0.016693	6.72	30.40	21.68	1.00
Alignment -wolf	379.47	PQ50	291.40	346.01	349.24	349.24	350.05	0.015946	7.22	40.34	24.98	1.00
Alignment -wolf	379.47	PQ100	367.10	346.01	349.54	349.55	350.44	0.015716	7.61	48.24	27.31	1.01
Alignment -wolf	336.24	EQ2	155.10	344.00	346.32	346.82	347.86	0.049361	9.96	15.58	13.59	1.64
Alignment -wolf	336.24	EQ10	245.30	344.00	346.80	347.36	348.59	0.044591	10.73	22.85	16.52	1.61
Alignment -wolf	336.24	EQ25	260.50	344.00	346.88	347.46	348.69	0.043611	10.80	24.11	16.97	1.60
Alignment -wolf	336.24	EQ50	321.40	344.00	347.14	347.75	349.07	0.041137	11.14	28.86	18.59	1.57
Alignment -wolf	336.24	EQ100	367.40	344.00	347.33	347.95	349.32	0.039464	11.33	32.42	19.71	1.56
Alignment -wolf	336.24	PQ2	59.30	344.00	345.56	345.91	346.68	0.060516	8.49	6.98	8.99	1.70
Alignment -wolf	336.24	PQ10	182.20	344.00	346.47	347.00	348.11	0.048062	10.26	17.76	14.53	1.64
Alignment -wolf	336.24	PQ25	204.40	344.00	346.60	347.14	348.29	0.046638	10.43	19.59	15.27	1.62
Alignment -wolf	336.24	PQ50	291.40	344.00	347.01	347.60	348.89	0.042384	10.99	26.51	17.81	1.59
Alignment -wolf	336.24	PQ100	367.10	344.00	347.33	347.95	349.32	0.039474	11.33	32.39	19.71	1.56
Alignment -wolf	300	EQ2	155.10	342.35	345.74	344.90	345.95	0.003939	3.67	42.22	25.03	0.50
Alignment -wolf	300	EQ10	245.30	342.35	346.34	345.42	346.61	0.004121	4.18	58.63	29.60	0.52
Alignment -wolf	300	EQ25	260.50	342.35	346.43	345.51	346.71	0.004149	4.26	61.19	30.25	0.53
Alignment -wolf	300	EQ50	321.40	342.35	346.74	345.77	347.06	0.004249	4.53	71.02	32.63	0.54
Alignment -wolf	300	EQ100	367.40	342.35	346.95	345.96	347.30	0.004311	4.70	78.11	34.25	0.55
Alignment -wolf	300	PQ2	59.30	342.35	344.77	344.09	344.89	0.003445	2.76	21.52	17.75	0.44
Alignment -wolf	300	PQ10	182.20	342.35	345.94	345.07	346.17	0.003997	3.84	47.40	26.56	0.51
Alignment -wolf	300	PQ25	204.40	342.35	346.09	345.20	346.33	0.004063	3.98	51.37	27.67	0.51
Alignment -wolf	300	PQ50	291.40	342.35	346.59	345.64	346.89	0.004204	4.40	66.24	31.50	0.53
Alignment -wolf	300	PQ100	367.10	342.35	346.95	345.95	347.29	0.004310	4.70	78.07	34.24	0.55
Alignment -wolf	292.09	EQ2	155.10	341.99	344.55	344.55	345.18	0.017431	6.40	24.23	19.06	1.00
Alignment -wolf	292.09	EQ10	245.30	341.99	345.04	345.04	345.82	0.016861	7.09	34.61	22.79	1.01
Alignment -wolf	292.09	EQ25	260.50	341.99	345.12	345.12	345.92	0.016724	7.17	36.32	23.35	1.01
Alignment -wolf	292.09	EQ50	321.40	341.99	345.39	345.39	346.26	0.016203	7.47	43.02	25.42	1.01
Alignment -wolf	292.09	EQ100	367.40	341.99	345.58	345.58	346.49	0.015882	7.67	47.92	26.83	1.01
Alignment -wolf	292.09	PQ2	59.30	341.99	343.73	343.73	344.17	0.020404	5.34	11.09	12.87	1.01
Alignment -wolf	292.09	PQ10	182.20	341.99	344.72	344.72	345.40	0.017078	6.61	27.55	20.33	1.00
Alignment -wolf	292.09	PQ25	204.40	341.99	344.84	344.84	345.56	0.016840	6.77	30.19	21.29	1.00
Alignment -wolf	292.09	PQ50	291.40	341.99	345.26	345.26	346.10	0.016428	7.33	39.77	24.44	1.01
Alignment -wolf	292.09	PQ100	367.10	341.99	345.58	345.58	346.49	0.015889	7.67	47.89	26.82	1.01

300'
FROM BD

HEC-RAS Plan: Plan 02 River: Wolf Canyon Reach: Alignment -wolf (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment -wolf	248.97	EQ2	155.10	340.00	341.85	342.44	343.72	0.067154	10.96	14.15	13.61	1.89
Alignment -wolf	248.97	EQ10	245.30	340.00	342.29	342.98	344.46	0.060023	11.82	20.76	16.37	1.85
Alignment -wolf	248.97	EQ25	260.50	340.00	342.35	343.06	344.57	0.059321	11.95	21.81	16.77	1.85
Alignment -wolf	248.97	EQ50	321.40	340.00	342.60	343.35	344.95	0.055549	12.29	26.15	18.34	1.81
Alignment -wolf	248.97	EQ100	367.40	340.00	342.77	343.55	345.21	0.053420	12.52	29.34	19.43	1.80
Alignment -wolf	248.97	PQ2	59.30	340.00	341.18	341.59	342.51	0.082836	9.25	6.41	9.34	1.97
Alignment -wolf	248.97	PQ10	182.20	340.00	342.00	342.62	343.96	0.064362	11.24	16.21	14.53	1.88
Alignment -wolf	248.97	PQ25	204.40	340.00	342.10	342.76	344.16	0.063197	11.50	17.78	15.19	1.87
Alignment -wolf	248.97	PQ50	291.40	340.00	342.49	343.22	344.77	0.057127	12.12	24.05	17.59	1.83
Alignment -wolf	248.97	PQ100	367.10	340.00	342.77	343.55	345.20	0.053434	12.52	29.32	19.42	1.80
Alignment -wolf	211.21	EQ2	155.10	338.01	339.94	340.40	341.40	0.050695	9.68	16.02	15.20	1.66
Alignment -wolf	211.21	EQ10	245.30	338.01	340.30	340.90	342.21	0.055100	11.08	22.13	18.23	1.77
Alignment -wolf	211.21	EQ25	260.50	338.01	340.35	340.98	342.33	0.055391	11.29	23.07	18.54	1.78
Alignment -wolf	211.21	EQ50	321.40	338.01	340.54	341.25	342.80	0.056749	12.08	26.62	19.68	1.83
Alignment -wolf	211.21	EQ100	367.40	338.01	340.67	341.44	343.12	0.057058	12.55	29.27	20.49	1.85
Alignment -wolf	211.21	PQ2	59.30	338.01	339.37	339.60	340.14	0.043002	7.04	8.42	11.44	1.45
Alignment -wolf	211.21	PQ10	182.20	338.01	340.07	340.57	341.65	0.053259	10.07	18.10	16.82	1.71
Alignment -wolf	211.21	PQ25	204.40	338.01	340.16	340.69	341.85	0.053664	10.43	19.60	17.36	1.73
Alignment -wolf	211.21	PQ50	291.40	338.01	340.45	341.12	342.58	0.056235	11.71	24.88	19.13	1.81
Alignment -wolf	211.21	PQ100	367.10	338.01	340.67	341.44	343.12	0.057062	12.55	29.25	20.48	1.85
Alignment -wolf	200	EQ2	155.10	337.41	339.54	339.95	340.84	0.041554	9.15	16.95	14.97	1.52
Alignment -wolf	200	EQ10	245.30	337.41	339.97	340.49	341.60	0.041829	10.25	23.92	17.89	1.56
Alignment -wolf	200	EQ25	260.50	337.41	340.03	340.56	341.71	0.041840	10.38	25.10	18.44	1.57
Alignment -wolf	200	EQ50	321.40	337.41	340.23	340.85	342.16	0.043612	11.14	28.85	19.64	1.62
Alignment -wolf	200	EQ100	367.40	337.41	340.37	341.04	342.46	0.044245	11.60	31.67	20.49	1.64
Alignment -wolf	200	PQ2	59.30	337.41	339.37	339.09	339.63	0.009187	4.09	14.49	13.79	0.70
Alignment -wolf	200	PQ10	182.20	337.41	339.70	340.13	341.08	0.040458	9.42	19.35	16.03	1.51
Alignment -wolf	200	PQ25	204.40	337.41	339.80	340.26	341.27	0.040804	9.72	21.04	16.74	1.53
Alignment -wolf	200	PQ50	291.40	337.41	340.13	340.71	341.95	0.043061	10.81	26.97	19.05	1.60
Alignment -wolf	200	PQ100	367.10	337.41	340.37	341.04	342.46	0.044246	11.60	31.65	20.49	1.64
Alignment -wolf	173.24	EQ2	155.10	336.00	338.70	338.70	339.38	0.017230	6.60	23.49	17.39	1.00
Alignment -wolf	173.24	EQ10	245.30	336.00	339.25	339.25	340.06	0.016243	7.20	34.07	21.21	1.00
Alignment -wolf	173.24	EQ25	260.50	336.00	339.33	339.33	340.15	0.016127	7.28	35.80	21.83	1.00
Alignment -wolf	173.24	EQ50	321.40	336.00	339.63	339.63	340.51	0.015723	7.55	42.56	24.11	1.00
Alignment -wolf	173.24	EQ100	367.40	336.00	339.82	339.83	340.75	0.015448	7.73	47.50	25.64	1.00
Alignment -wolf	173.24	PQ2	59.30	336.00	337.83	337.83	338.30	0.020145	5.51	10.77	11.78	1.01
Alignment -wolf	173.24	PQ10	182.20	336.00	338.88	338.88	339.60	0.016851	6.82	26.73	18.56	1.00

400'
FROM BD

HEC-RAS Plan: Plan 02 River: Wolf Canyon Reach: Alignment -wolf (Continued)

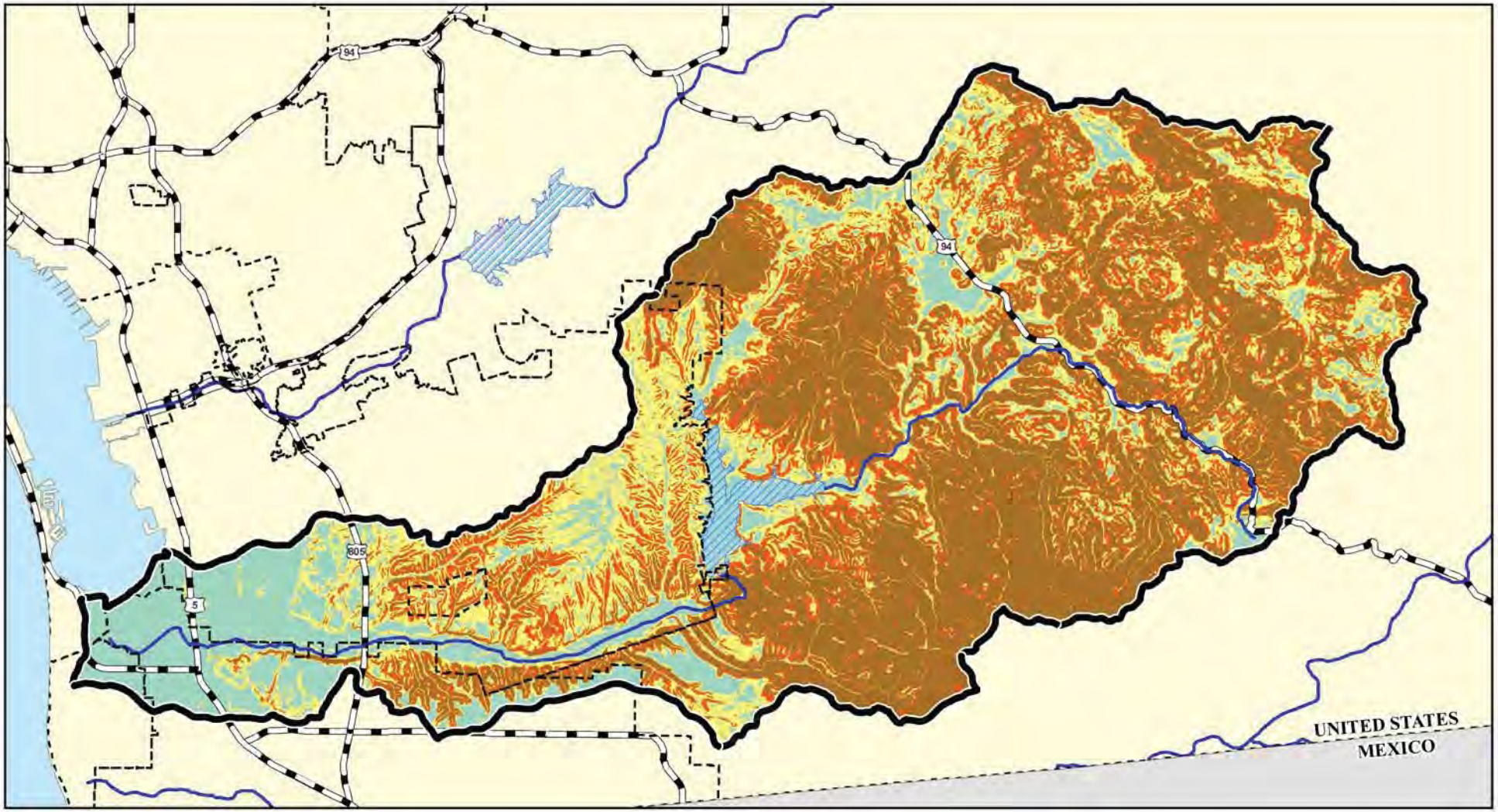
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment -wolf	173.24	PQ25	204.40	336.00	339.02	339.02	339.77	0.016623	6.97	29.35	19.53	1.00
Alignment -wolf	173.24	PQ50	291.40	336.00	339.49	339.49	340.34	0.015902	7.42	39.27	23.03	1.00
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Alignment -wolf	135.29	EQ2	155.10	333.99	336.47	337.03	338.21	0.053226	10.59	14.64	11.95	1.69
Alignment -wolf	135.29	EQ10	245.30	333.99	337.00	337.63	338.96	0.047478	11.24	21.83	15.06	1.65
Alignment -wolf	135.29	EQ25	260.50	333.99	337.08	337.71	339.07	0.046691	11.32	23.01	15.52	1.64
Alignment -wolf	135.29	EQ50	321.40	333.99	337.36	338.03	339.46	0.043955	11.62	27.66	17.18	1.61
Alignment -wolf	135.29	EQ100	367.40	333.99	337.55	338.25	339.73	0.042491	11.84	31.03	18.29	1.60
Alignment -wolf	135.29	PQ2	59.30	333.99	335.64	336.05	336.94	0.067509	9.14	6.49	7.88	1.78
Alignment -wolf	135.29	PQ10	182.20	333.99	336.64	337.23	338.46	0.051257	10.82	16.84	12.99	1.67
Alignment -wolf	135.29	PQ25	204.40	333.99	336.78	337.38	338.65	0.049789	10.98	18.62	13.76	1.66
Alignment -wolf	135.29	PQ50	291.40	333.99	337.22	337.88	339.27	0.045240	11.48	25.38	16.38	1.63
Alignment -wolf	135.29	PQ100	367.10	333.99	337.55	338.24	339.73	0.042502	11.84	31.00	18.28	1.60
Alignment -wolf	100	EQ2	155.10	332.13	336.23	335.17	336.45	0.003514	3.81	40.71	20.11	0.47
Alignment -wolf	100	EQ10	245.30	332.13	336.93	335.76	337.23	0.003745	4.37	56.12	23.69	0.50
Alignment -wolf	100	EQ25	260.50	332.13	337.03	335.85	337.34	0.003777	4.45	58.53	24.20	0.50
Alignment -wolf	100	EQ50	321.40	332.13	337.40	336.17	337.75	0.003884	4.74	67.82	26.09	0.52
Alignment -wolf	100	EQ100	367.40	332.13	337.65	336.40	338.03	0.003951	4.93	74.52	27.36	0.53
Alignment -wolf	100	PQ2	59.30	332.13	335.08	334.18	335.21	0.002964	2.82	21.01	14.28	0.41
Alignment -wolf	100	PQ10	182.20	332.13	336.46	335.37	336.71	0.003591	4.00	45.58	21.31	0.48
Alignment -wolf	100	PQ25	204.40	332.13	336.64	335.52	336.90	0.003648	4.14	49.41	22.20	0.49
Alignment -wolf	100	PQ50	291.40	332.13	337.23	336.02	337.55	0.003835	4.60	63.31	25.19	0.51
Alignment -wolf	100	PQ100	367.10	332.13	337.65	336.39	338.03	0.003951	4.93	74.47	27.35	0.53
Alignment -wolf	97.53	EQ2	155.10	332.00	334.99	334.99	335.73	0.017391	6.92	22.42	15.12	1.00
Alignment -wolf	97.53	EQ10	245.30	332.00	335.57	335.57	336.48	0.016711	7.64	32.10	18.09	1.01
Alignment -wolf	97.53	EQ25	260.50	332.00	335.66	335.66	336.58	0.016576	7.73	33.68	18.53	1.01
Alignment -wolf	97.53	EQ50	321.40	332.00	335.97	335.97	336.98	0.016117	8.07	39.85	20.16	1.01
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Alignment -wolf	97.53	PQ10	182.20	332.00	335.17	335.17	335.98	0.017302	7.19	25.35	16.07	1.01
Alignment -wolf	97.53	PQ25	204.40	332.00	335.32	335.32	336.16	0.017138	7.37	27.73	16.81	1.01
Alignment -wolf	97.53	PQ50	291.40	332.00	335.82	335.82	336.79	0.016327	7.91	36.84	19.38	1.01
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Alignment -wolf	59.54	EQ2	155.10	329.99	331.92	332.63	334.27	0.091170	12.29	12.62	12.85	2.19
Alignment -wolf	59.54	EQ10	245.30	329.99	332.33	333.18	335.08	0.082709	13.31	18.43	15.48	2.15
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Alignment -wolf	59.54	EQ50	321.40	329.99	332.62	333.55	335.63	0.077842	13.93	23.08	17.30	2.12

500'
FROM BD

HEC-RAS Plan: Plan 02 River: Wolf Canyon Reach: Alignment -wolf (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment -wolf	59.54	EQ100	367.40	329.99	332.77	333.75	335.92	0.075497	14.24	25.80	18.28	2.11
Alignment -wolf	59.54	PQ2	59.30	329.99	331.29	331.78	332.93	0.108358	10.26	5.78	8.80	2.23
Alignment -wolf	59.54	PQ10	182.20	329.99	332.06	332.82	334.54	0.088171	12.64	14.41	13.71	2.17
Alignment -wolf	59.54	PQ25	204.40	329.99	332.16	332.96	334.74	0.086028	12.90	15.85	14.37	2.16
Alignment -wolf	59.54	PQ50	291.40	329.99	332.51	333.42	335.43	0.079581	13.70	21.27	16.61	2.13
Alignment -wolf	59.54	PQ100	367.10	329.99	332.77	333.75	335.92	0.075517	14.24	25.78	18.27	2.11
Alignment -wolf	31.07	EQ2	155.10	327.99	329.58	330.12	331.39	0.099491	10.80	14.36	19.53	2.22
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Alignment -wolf	31.07	EQ25	260.50	327.99	329.86	330.56	332.43	0.112083	12.86	20.25	23.17	2.42
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Alignment -wolf	31.07	EQ100	367.40	327.99	330.07	330.96	333.27	0.116580	14.35	25.60	25.58	2.53
Alignment -wolf	31.07	PQ2	59.30	327.99	329.18	329.48	330.12	0.078381	7.76	7.64	14.25	1.87
Alignment -wolf	31.07	PQ10	182.20	327.99	329.66	330.25	331.69	0.103763	11.42	15.95	20.57	2.29
Alignment -wolf	31.07	PQ25	204.40	327.99	329.72	330.33	331.90	0.106145	11.86	17.24	21.38	2.33
Alignment -wolf	31.07	PQ50	291.40	327.99	329.92	330.69	332.69	0.114448	13.33	21.86	24.06	2.47
Alignment -wolf	31.07	PQ100	367.10	327.99	330.07	330.96	333.27	0.116583	14.35	25.58	25.57	2.53
Alignment -wolf	0	EQ2	155.10	325.82	327.76	328.19	329.09	0.051233	9.25	16.77	17.28	1.65
Alignment -wolf	0	EQ10	245.30	325.82	328.12	328.65	329.80	0.051344	10.38	23.64	20.51	1.70
Alignment -wolf	0	EQ25	260.50	325.82	328.18	328.71	329.90	0.051493	10.55	24.70	20.97	1.71
Alignment -wolf	0	EQ50	321.40	325.82	328.36	328.97	330.30	0.052092	11.18	28.75	22.56	1.74
Alignment -wolf	0	EQ100	367.40	325.82	328.48	329.14	330.61	0.053087	11.71	31.37	23.25	1.78
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Alignment -wolf	0	PQ10	182.20	325.82	327.88	328.34	329.32	0.051040	9.61	18.95	18.37	1.67
Alignment -wolf	0	PQ25	204.40	325.82	327.97	328.46	329.50	0.051073	9.90	20.66	19.18	1.68
Alignment -wolf	0	PQ50	291.40	325.82	328.27	328.85	330.11	0.051847	10.87	26.80	21.84	1.73
Alignment -wolf	0	PQ100	367.10	325.82	328.48	329.14	330.60	0.053082	11.71	31.35	23.25	1.78

Appendix H



Legend

- 0 to 5 Percent
- 5 to 15 Percent
- 15 to 25 Percent
- Greater than 25 Percent

Basemap Legend

- Otay River Watershed Boundary
- City Boundary
- Rivers
- Lakes

N

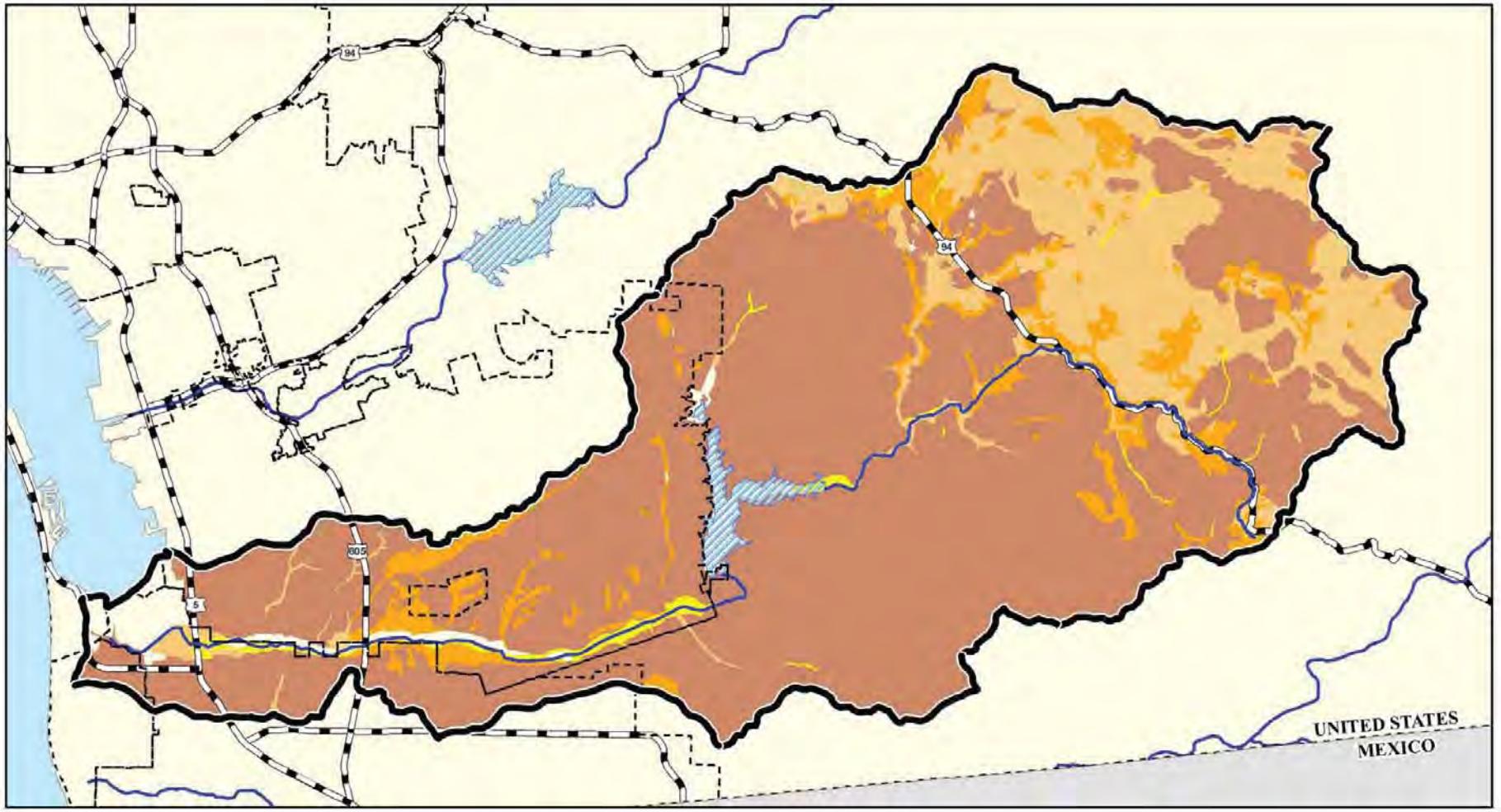
0 2.5 5
Scale in Miles

Otay River Watershed Management Plan

Figure B.7-1

Slope

Aspen Environmental Group



Legend

- Group A — Soils have a high infiltration rate when thoroughly wetted; chiefly deep, well-drained to excessively drained sand, gravel, or both. Rate of water transmission is high; thus runoff potential is low.
- Group B — Soils have a moderate infiltration rate when thoroughly wetted; chiefly soils that are moderately deep to deep, moderately well drained to well drained, and moderately coarse textured. Rate of water transmission is moderate.
- Group C — Soils have a slow infiltration rate when thoroughly wetted; chiefly soils that have a layer impeding downward movement of water, or moderately fine to fine textured soils that have a slow infiltration rate. Rate of water transmission is slow.
- Group D — Soils have a very slow infiltration rate when thoroughly wetted; chiefly clays that have a high shrink-swell potential, soils that have a high permanent water table, soils that have a claypan or clay layer at or near the surface, or soils that are shallow over nearly impervious material. Rate of water transmission is very slow.

Basemap Legend

- Otay River Watershed Boundary
- City Boundary
- Rivers
- Lakes

0 2.5 5

Scale in Miles

N

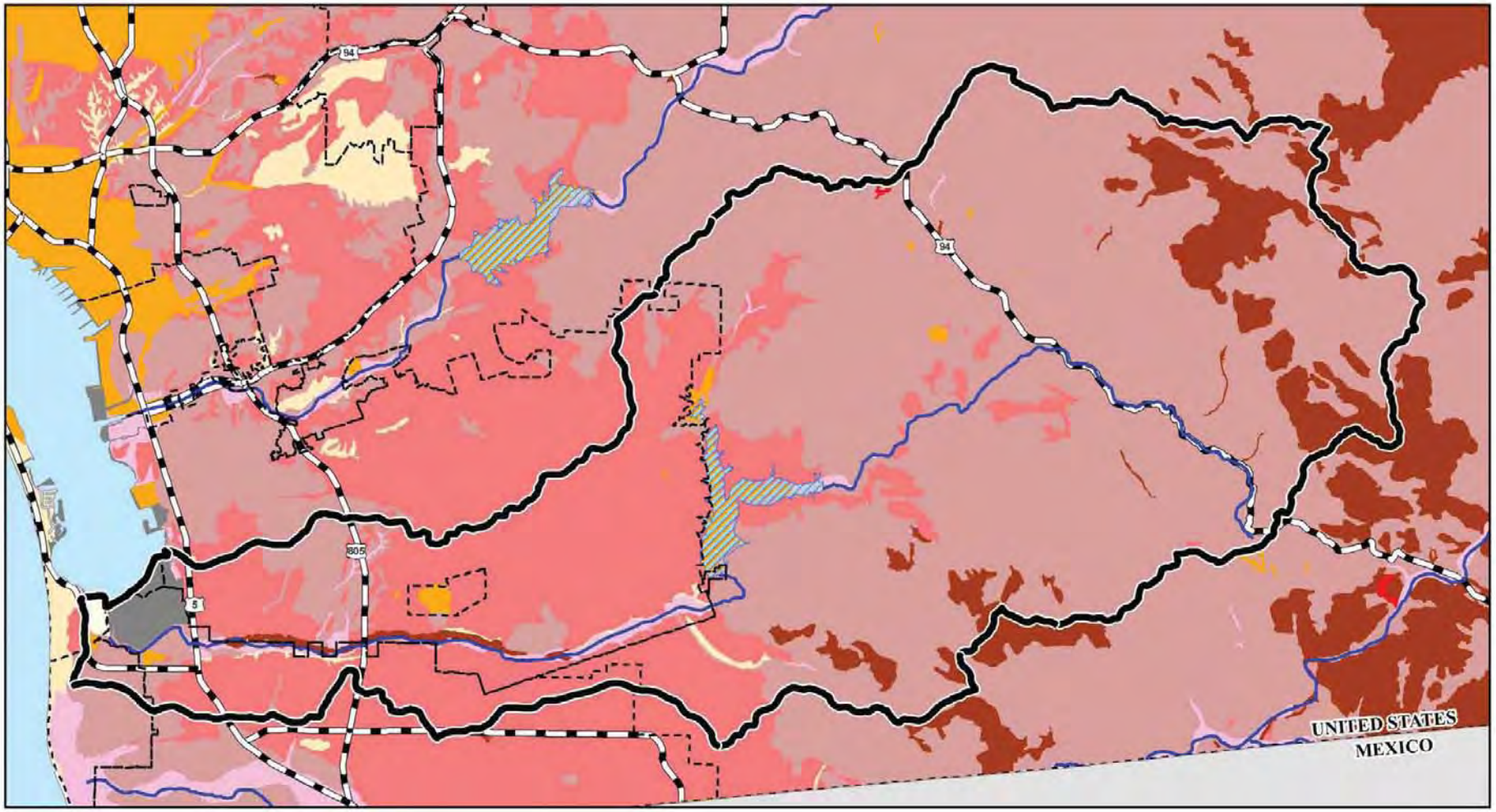
Source: TAIC, 2004

Otay River Watershed Management Plan

Figure B.7-2

Hydrologic Soil Groups

Aspen Environmental Group



Legend

- Clay
- Coarse Sand
- Loam
- Other
- Rock
- Sand
- Silt
- Unknown

Basemap Legend

- Otay River Watershed Boundary
- City Boundary
- Rivers
- Lakes

N

0 2.5 5

Scale in Miles

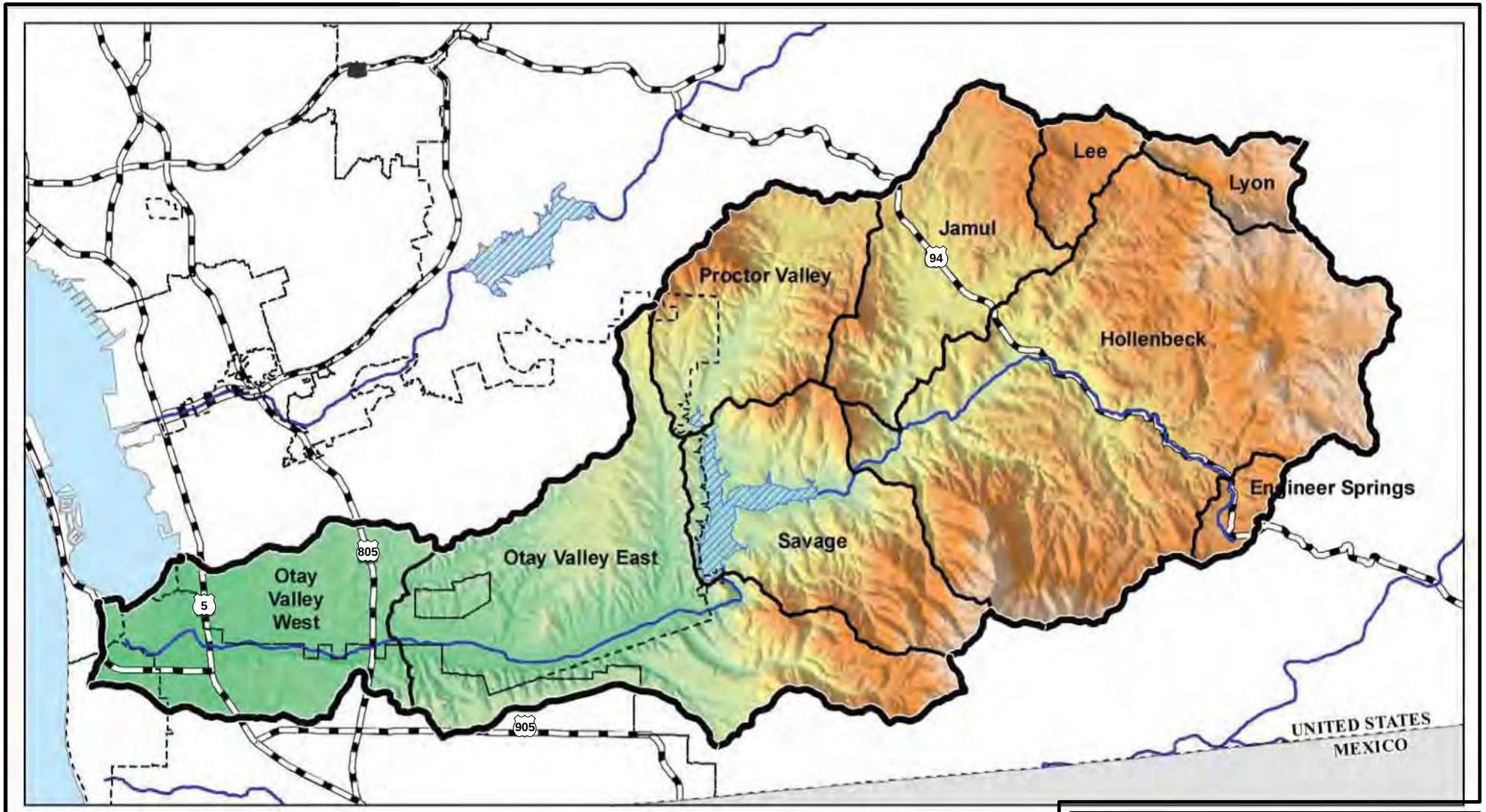
Source: TAIC, 2004

Otay River Watershed Management Plan

Figure B.7-3

Soil Texture

Aspen Environmental Group



Legend

Sea Level — 3,700 Feet

N

0 2.5 5

Scale in Miles

Basemap Legend

- Otay River Watershed Boundary
- City Boundary
- Rivers
- Lakes

Source: TAIC, 2005

Otay River Watershed Management Plan

Figure C.9-2

Shaded Relief and Sub-Basin Boundaries

Aspen Environmental Group

Appendix I

Hydromodification Study

For

Otay Ranch

Village 8 West

Chula Vista Tract No. 09-XX

John A. Hayes, P.E.
R.C.E. # 58003
Expiration Date: June 30, 2014

Prepared For
Otay Land Company, LLC
1903 Wright Place, Suite 220
Carlsbad, CA 92008
(760) 602-3777

Prepared By
Hale Engineering
7910 Convoy Court
San Diego, CA 92111
(858) 715-1420



Date: August 26, 2011

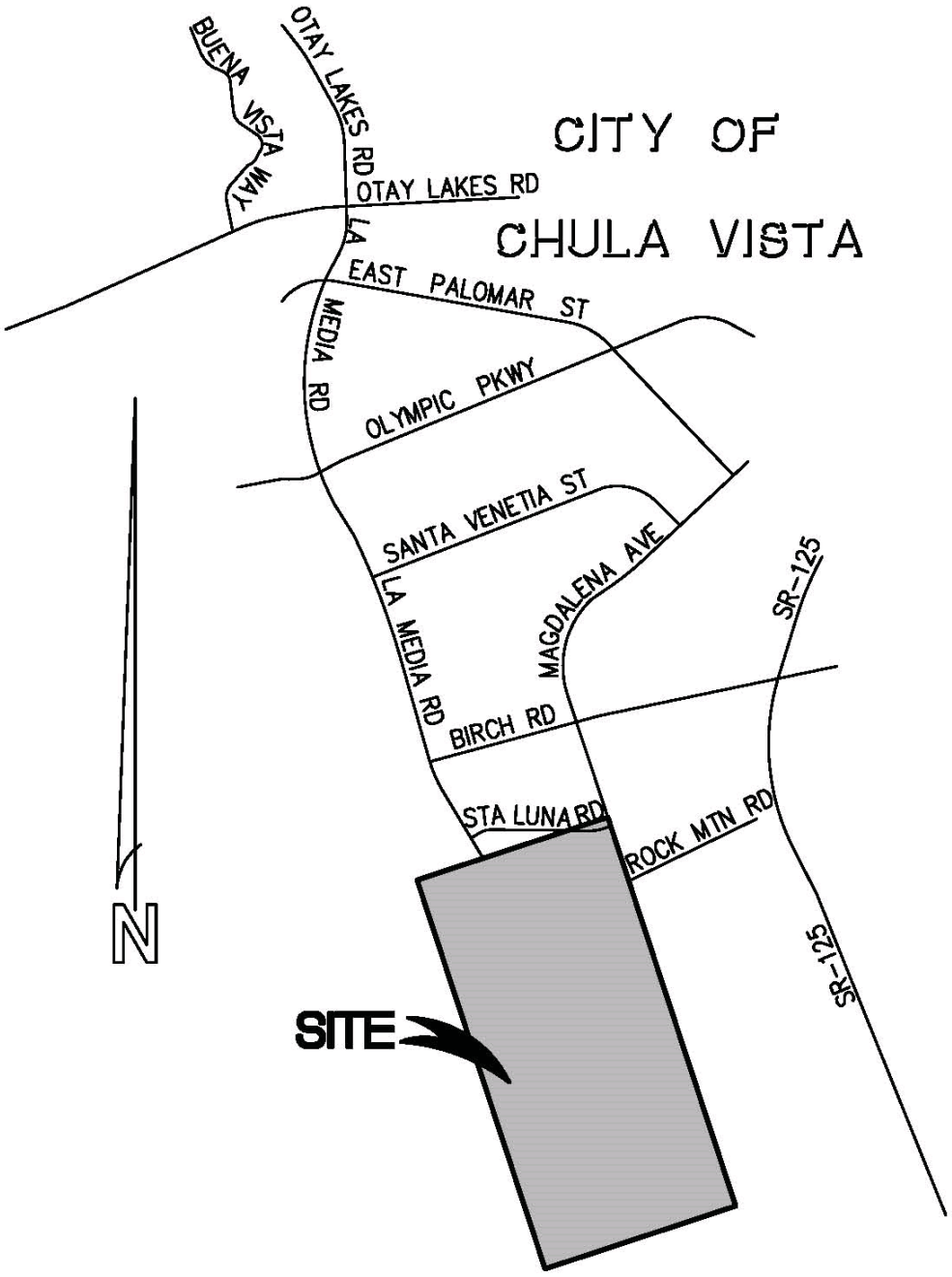
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2 Introduction....2
3 Hydromodification Method and Criteria....3
3.1 Hydromodification Methodology:....3
4 Hydromodification Results....4
4.1 Pre-Developed Condition....5
4.2 Developed Condition....6
5 Conclusions....7

Appendices

Appendix 1 Hydro-Modification Pre-Developed Land Use Exhibit
Appendix 2 Hydro-Modification Post-Development Land Use Exhibit
Appendix 3 San Diego Hydrology Model (SDMH) Program Results
Appendix 4 Outlet Structure Details and Calculations
Appendix 5 HEC-HMS routing results

1 Vicinity Map



2 Introduction

The proposed project is located within the Otay Watershed, specifically the Otay Valley Hydrologic Area. Village 8 West is a 320-acre SPA (Special Planning Area) portion of the larger Otay Valley Parcel of the City of Chula Vista currently used for light agrarian and grazing purposes. An existing reservoir occupies a central portion of the property. The Otay Valley Parcel is the largest parcel of Otay Ranch, comprising 9,449 acres bounded by Telegraph Canyon Road on the north, Heritage Road and the Otay Landfill Site on the west, Brown Field on the south, and Lower Otay Lake on the east.

The northern portion of the proposed project will ultimately drain to Wolf Canyon via two of five proposed storm drain systems. The other three storm drain systems drain the remainder of the project to the Otay River southerly of the southern boundary of the proposed project.

The discharge to the Otay River is downstream of the Otay reservoir. The first Otay dam failed in an event which degraded the downstream Otay River. Per the Final Hydromodification, the lower Otay River Valley is listed as a river reach that is exempt from hydromodification analysis (see section 6, page 6.6, table 6.1 of the Final HMP dated March 2011, Therefore no calculations for hydromodification or storage routing have been performed for discharge into Otay River. Within this report are the necessary hydromodification calculations required for the design of the detention basin proposed per the project.

The design of the backbone storm drain system is performed in a separate hydrologic analysis. Refer to the "Preliminary Drainage Study for Otay Ranch Village 8 West" for the project storm drain design.

3 Hydromodification Method and Criteria

Clear Creek Solution, Inc's San Diego Hydrology Model (SDHM) software program is adapted from Western Washington Hydrology Manual (WWHM) Version 3, but has been modified to represent San Diego County hydrology and enhanced to be able to size other types of control measures and low impact development (LID) techniques for flow reduction as well.

3.1 Hydromodification Methodology:

The SDHM software architecture and methodology is the same as that developed for BAHM (Bay Area Hydrology Model) and WWHM and uses HSPF as its computational engine. Like BAHM and WWHM, SDHM is a tool that generates flow duration curves for the pre- and post-project condition and then sizes a flow duration control pond/basin or vault and outlet structure to match the pre-project curve.

The HSPF hydrology parameter values used in SDHM are based on calibrated watersheds. SDHM incorporates the rain gage data provided on the Project Clean Water website; the Lower Otay rain gage data is used in the calculations provided within this report. SDHM runs HSPF to generate an hourly runoff time series from the available rain gauge data over a number of years. Stormwater runoff is computed for both pre-project and post-project land use conditions. Then, SDHM routes the post-project stormwater runoff through the proposed stormwater. SDHM uses the pre-project peak flood value for each water year to compute the pre-project 2- through 100-year flood frequency values[1]. The post-project runoff 2- through 100-year flood frequency values are computed at the outlet of the proposed stormwater facility. The model routes the post-project runoff through the stormwater facility. As with the pre-project peak flow values, the maximum post-project flow value for each water year is selected by the model to compute the developed 2- through 100-year flood frequency. The pre-project 2-year peak flow is multiplied by 10% to set the lower limit of the erosive flows, in accordance with the current HMP performance criteria[2]. The pre-project 10-year peak flow is the upper limit. A comparison of the pre-project and post-project flow duration curves is conducted for 100 flow levels between the lower limit and the upper limit. The model counts the number of hours that pre-project flows exceed each of the flow levels during the entire simulation period. The model does the same analysis for the post-project mitigated flows.

[1] The actual flood frequency calculations are made using the Weibull ranking procedure described in Bulletin 17B (United States Water Resources Council, 1981).

[2] In SDHM, this low flow limit is a user-defined variable, to allow flexibility pending potential changes in regulatory requirements.

4 Hydromodification Results

The SDHM program results are included in Appendix 3. The computed flow rates for the Wolf Canyon discharge point of compliance are as follows:

	Storm Event			
	2-Year	5-Year	10-Year	25-Year
Pre-Project Flow (cfs)	28.6	39.0	55.6	93.0
Post-Project Flow (cfs)	17.1	31.8	40.1	63.9

The post-project flows shown above are calculated based on the inclusion of a detention basin with the following design parameters:

- Total Storage Volume = 23.3 Acre-feet
- Depth = 24' feet
- Side Slope = 2:1 (Horizontal: Vertical)
- Outlet Structures See Section 4
- SSD (Stage, Storage, Discharge) Table provided in report
- Developed flows calculated for the various return periods using the Modified Rational Method (per County of SD Hydrology manual) are higher than those calculated by HSPF. The higher flow values were routed through the basin using HEC-HMS 3.3 to verify capacity. The results are provided in this report. (See Section 5)
- No manual infiltration assumed.

4.1 Pre-Developed Condition

In the pre-developed condition, a 183.6-acre drainage area outlets at the point of compliance of Wolf Canyon. This basin is composed of the northern portion of Village 8 West and a portion of Otay Ranch Village 7. In the pre-developed condition, the northern portion of Village 8 west is undeveloped while the tributary portion of Otay Ranch Village 7 contains a high school and associated roadways. Land uses of the pre-developed drainage area breakdown as follows:

- C, D, Grass, Site (10-20%) = 31.4 acres
- C, D, Dirt, ST (10-20%) = 94.0 acres
- C, D, Urban, Flat (0-5%) = 20.0 acres
- Roads, Mod (5-10%) = 14.3 acres
- Roof Area = 5.0 acres
- Hardscape, Flat (0-5%) = 18.9 acres

See Appendix 1 Hydro-Modification Pre-Developed Land Use Exhibit for the locations of the various land use types in the drainage area.

As described in Section 3, design data from Project Clean Water was used with Clear Creek Solution, Inc's San Diego Hydrological Model (SDHM) software in the hydromodification analysis of the Pre-Developed Condition.

4.2 Developed Condition

In the developed condition, a 202.6-acre drainage area outlets at the point of compliance of Wolf Canyon. This basin is composed of the northern portion of Village 8 West and a portion of Otay Ranch Village 7. In the developed condition, the northern portion of Village 8 west is developed with graded pads for future development and associated paved roadways and the tributary portion of Otay Ranch Village 7 shall continue to house the existing high school and associated roadways. Land uses of the developed drainage area breakdown as follows:

- C, D, Grass, Site (0-5%) = 2.5 acres
- C, D, Grass, Site (10-20%) = 32.4 acres
- C, D, Grass, Site (> 20%) = 12.0 acres
- C, D, Urban, Flat (0-5%) = 37.0 acres
- Roads, Mod (5-10%) = 36.2 acres
- Roof Area = 12.6 acres
- Hardscape, Flat (0-5%) = 18.9 acres
- Parking, Flat (0-5%) = 51.0 acres

See Appendix 2 Hydro-Modification Development Land Use Exhibit for the locations of the various land use types in the drainage area.

As described in Section 3, design data from Project Clean Water was used with Clear Creek Solution, Inc's San Diego Hydrological Model (SDHM) software in the hydromodification analysis of the Developed Condition.

5 Conclusions

This Hydromodification Study contains analyses for the 2-, 10-, 25-, and 50-year, storm events. These analyses are used in the design and sizing of the proposed detention basin upstream of the Wolf Canyon point of compliance. This basin is for flow control only; see the Water Quality Technical Report for storm water runoff treatment BMP's. With the inclusion of the proposed detention basin, post-project flow rates at the point of compliance of the Wolf Canyon discharge shall be less than pre-project rates for the 2-, 5-, 10-, and 50-year storms.

SECTION 1

HYDRO-MODIFCATION PREDEVELOPED LAND USE EXHIBIT

OTAY RANCH, VILLAGE 8 WEST

CITY OF CHULA VISTA, CALIFORNIA, TRACT NO. 09-_



---.J.I. I.All) 11E

oo gmmAL AfEA

CA CN\lB, SISI>-20X)	3IA
CA CRT,STtl>-2DZ)	788
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CA IJIIAN, R.AT(o-S)	1· 200

AOAD8, MOD(5-mJ

ROCF NEA — 50 AC

HAfl:l8CAPE, R.AT(O-S) — U

TOTAL: 1118

SCALE: 1" = 300'

JOO 0 JOO 600 llOO

SC/11£ 1" = JOO'

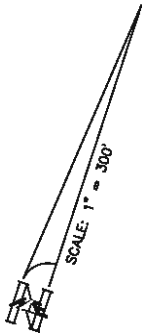
SECTION 2

HYDRO-MODIFCATION DEVELOPED LAND USE EXHIBIT

OTAY RANCH, VILLAGE 8 WEST

CITY OF CHULA VISTA, CALIFORNIA, TRACT NO. 09-_





I..NDIIE oo t!VTPTAL NEA

CA c:IWIB, R..AT(HX) I.II*N;*

CA c:IWIB, STSr>-20X) *32A N;*

CA c:IWIB, BIE()20Z) 120 *N;*

CA '1IWI, R..AT(Q-S) *SID N;*

ROAD8, MOO(&-m>

AOC'JF NEA 12.8 AC

HAfDBCAPE, R..AT(HX) *N;*

PNIClIQ, R..AT<0-5X) SIO *N;*

TOI'AL.i IOU *tC*

OIHIIE NEA OONIJBIDON

ROAD8, MOO(5-m)-20.I *N;*

CA c:IWIB. BTE02DX)oa..OPEB- 118 *tC*

10PAD AfEA&C18 *tC* (IOZ U'BMOUB)o

— PNIClIQ, R..A'l'(0-5Z)o&O *tC*

-C,D,'1IWI, R..A'TCO-SX>-128 *N;*

SFLD18 AfEA-ll2 *tC* c:m: IMPBMOUB)

— AOCF-7.8 *N;*

— CA'1IWI. R..ATCo-m>-7.e *tC*

PAACS-CA c.tASB, R..ATC0-6X>-2.6 *tC*

.!CO 0 JOO 600 llOO

SC/IIE 1" = JOO

SECTION 3

Project Name; VB WEST-park
Site Name V8W
Site Address: LA MEDIA
City Chula Vista
Report Date 8/1/2011
Gage LWR OTA'i
Data. Start 10/01/1959
Data End 09/30/2004
Precip Scale: I.OO
Version 2011/06/22

PREDEVELOPED LAND USE

Name Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C D,Grass,Ste(l0-20)	31.4
C D,Dirt, St(l0-2oi> .	78.3
C D,Urban,Flat(0-5%)	20

Impervious Land Use	Acres
Roads,Mod(S-10%)	14.3
Roof Area	5
Sidewalks,Flat (0-5%)	18.9

Element Fldws To:
Surface Interflow Groundwater

Name .Existing PaLk Area
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C D,Dirt, St(l0-20%)	15.7

Impervious Land Use	Acres

Element Flows To:
Surface Interflow Groundwater

MITIGATED I.AND USE

Name Basin 1
Bypass: No

Groundwater: No

Pervious Land Use	Acres
C D,Grass,Ste(l0-20)	32.4

C D,Urban,Flat (0-5%)	37
C D,Grass,Flat (0-5%)	2.5
C D,Grass,Very (>20%)	12

Impervious Land Use	Acres
Roads,Mod(5-10%)	36.2
Roof Area	12.6
Sidewalks,Flat (0-5%)	19.9
Parking,Flat (0-5%)	51

Element Flows To:

Surface	Interflow	Groundwater
SSD Table 1	SSD Table 1	

Name SSD Table 1
Depth: 24 ft.

Element Flows To:
Outlet 1 Outlet 2
Culvert 1

SSD Table Hydraulic Table

Stage (ft)	Area (ac)	Volume (ac-ft)	Manual	NotUsed	NotUsed	NotUsed	NotUsed
0.000	0.557	0.000	0.000	0.000	0.000	0.000	0.000
1.000	0.590	0.573	0.657	0.000	0.000	0.000	0.000
2.000	0.624	1.180	0.929	0.000	0.000	0.000	0.000
3.000	0.659	1.822	1.137	0.000	0.000	0.000	0.000
4.000	0.695	2.499	1.313	0.000	0.000	0.000	0.000
5.000	0.732	3.212	1.468	0.000	0.000	0.000	0.000
6.000	0.770	3.963	1.608	0.000	0.000	0.000	0.000
7.000	0.808	4.752	1.737	0.000	0.000	0.000	0.000
8.000	0.848	5.580	1.857	0.000	0.000	0.000	0.000
9.000	0.889	6.448	1.970	0.000	0.000	0.000	0.000
10.000	0.930	7.357	3.390	0.000	0.000	0.000	0.000
11.00	0.972	B.309	4.035	0.000	0.000	0.000	0.000
12.00	1.016	9.303	7.175	0.000	0.000	0.000	0.000
13.00	1.060	10.34	8.708	0.000	0.000	0.000	0.000
14.00	1.105	11.42	15.19	0.000	0.000	0.000	0.000
15.00	1.151	12.55	26.32	0.000	0.000	0.000	0.000
16.00	1.198	13.73	50.60	0.000	0.000	0.000	0.000
17.00	1.246	14.95	63.01	0.000	0.000	0.000	0.000
18.00	1.295	16.22	89.67	0.000	0.000	0.000	0.000
19.00	1.345	17.54	128.8	0.000	0.000	0.000	0.000
20.00	1.395	18.91	176.0	0.000	0.000	0.000	0.000
21.00	1.447	20.33	229.8	0.000	0.000	0.000	0.000
22.00	1.501	21.80	304.6	0.000	0.000	0.000	0.000
23.00	1.556	23.33	435.4	0.000	0.000	0.000	0.000

Name Culvert 1
Discharge Structure
Riser Height: 0 Et.
Riser Diameter: 0 in.

Element Flows To:
Outlet 1 Outlet 2

Name Lot A: Park
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C D,Grass,Flat(0-5%)	10.4

Impervious Land Use	Acres
Roads,Flat(0-5%)	5.6

Element Flows To:

Surface	Interflow	Groundwater
Culvert 2	Culvert 2	

Name Culvert 2
Discharge Structure
Riser Height: 0 ft.
Riser Diameter: 0 in.

Element Flows To:

Outlet 1	Outlet 2

ANALYSIS RESULTS

Flow Frequency Return Periods for Predeveloped. POC 1

Return Period	Flow(cfs)
2 year	28.552977
5 year	38.963207
10 year	55.647814
25 year	92.969818

Flow Frequency Return Periods for Mitigated. POC 1

Return Period	Flow(cfs}
2 year	17.108301
5 year	31.799082
10 year	40.11682
25 year	63.861616

POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
2.8553	1891	1871	98	Pass
3.3886	1409	1489	105	Pass
3.9218	1125	1027	91	Pass
4.4551	980	800	81	Pass
4.9883	837	702	83	Pass
5.5216	770	635	82	Pass
6.0548	691	589	85	Pass
6.5881	616	521	84	Pass
7.1214	533	44	83	Pass
7.6546	460	394	85	Pass
8.1879	409	334	81	Pass
8.7211	374	285	76	Pass
9.2544	336	256	76	Pass
9.7876	311	234	75	Pass
10.3209	275	216	78	Pass

10.8542	249	201	80	Pass
11.3874	227	189	83	Pass
11.9207	208	179	86	Pass
12.4539	198	171	86	Pass
12.9872	186	163	87	Pass
135205	179	157	87	Pass
1.4 .0537	164	149	90	Pass
14.5870	154	140	90	Pass
15.1202	146	130	89	·Pass
15.6535	137	126	91	Pass
16.1867	130	118	90	Pass
16.7200	126	113	89	Pass
17.2533	117	108	92	Pass
17.7865	ll-1	99	89	Pass
18.3198	108	92	85	Pass
18.8530	104	87	83	Pass
19.3863	100	83	83	Pass
19.9195	94	83	88	Pass
20.4528	92	75	81	Pass·
20.9861	86	69	80	Pass
21.5193	79	67	84	Pass
22.0526	74	60	81	Pass
22.5858	73	56	76	Pass
23.1191	68	52	76	Pass
23.6523	63	50	79	Pass
24.1856	62	48	77	Pass
24.7189	58	47	81	Pass
25.2521	54	44	81	Pass
25.7854	52	42	80	Pass
26.3186	49	41	83	Pass
26.8519	45	38	84	Pass
27.3852	44	37	84	Pass
27.9184	43	35	81	Pass
28.4517	41	34	82	Pass
28.9849	38	34	89	Pass
29.5102	36	34	94	·Pass
30.0514	32	31	96	Pass
30.5847	31	30	96	Pass
31.1180	30·	28	93	Pass.
31.6512	28	23	82	Pass
32.1845	25	22	88	Pass
32.7177	23	21	91	Pass
33.2510	22	18	81	Pass
33.7842	21	18	85	Pass
34.3175	21	17	80	Pass
34-.8508	19	15	78	Pass
35.3840	18	14	77	Pass
35.9173	18	13	72	Pass
36.4505	18	12	66	Pass
36.9838	17	12	70	Pass
37.5171	17	12	70	Pass
38.0503	16	12	75.	·Pass
38.5836	16	12	75	Pass
39.1168	15	10	66	Pass
39.6501	13	9	69	Pass
40.1833	13	9	69	Pass
40.7166	13	9	69	Pass
41..2499	13	9	69	Pass
4),.7831	12	9	75	Pass
42.3164	12	9	75	Pass
42.8496	12	9	75	Pass
43.3829	12	9	75	Pass
43.9161	11	9	81	Pass
44.4494	11	9	81	Pass
44.9827	11	8	72	Pass
45.5159	11	8	72	Pass
46.0492	11	8	72	Pass
46.5824	11	8	72	Pass
47.1157	10	8	80	Pass
47.6489	10	B	80	Pass
48.1822	10	8	80	Pass
48.7155	9	8	88	Pass
49.2487	9	8	88	Pass

49.7820	9	8	88	Pass
50.3152	9	B	88	Pass
50.8485	9	8	88	Pass
51.38113	9	7	77	Pass
51.9150	9	7	77	Pass
52.4483	9	6	66	Pass
52.9815	B	5	62	Pass
53.5148	8	5	62	Pass
54.0480	8	5	62	Pass
54.5813	8	5	62	Pass
55.1146	8	5	62	Pass
55.6478	6	4	66	Pass

Water Quality BMP Flow and Volume for POC ffl
On-line facility volume: 0 acre-feet
On-line facility target flow: 0 c.fs.
Adjusted for 15 min: 0 ofs.
Off-line facility target flow: 0 cfs.
Adjusted for 15 min: 0 ofs.

Perlnd and Implnd Changes
No changes have been made.

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SDHM V8 WEST-park

File Edit View Help Summary Report

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Analysis

Drawdown Analysis

Select analysis for 1001 SSD. Table 1 STAGE Mitigated

Analyze Stage Pond: SSD Table 1

Drain Time (days)	Stage (feet)	Percent of Total Run Time
1	16.12927	116644
2	N/A	N/A
3	N/A	fftA
4	N/A	N/A
5	N/\	N/A

Max Stage (ft) 11aoo398

Drawdown Time [dd hh:mm:ss) 101 22:51:20

Pond drains in less than 2 days.

Durations | **Flow Frequency** | **Drawdow n** | Hydrograph

Recharge Duration | Recharge Predevebped | Recharge Mitigated

Analyze datasets-

1001 SSD Table 1 STAGE Mitigated
1007 Culvert 1 STAGE Mitigated
1009 Culvert 2 STAGE Mitigated

All Datasets | Flow | Stage | Precip | Evap | POC 1

Duration Bounds

litb1 | **Minimum** 12 | Mf. tmurri

r Seasonal Duration (mm/dd)

Start Date D

Date D

SECTION 4

By selecting the appropriate notch type the user is then given the option to enter the appropriate notch type dimensions.

Riser and orifice equations used in SDHM are provided below.

Headr = the water height over the notcb/orifice bottom.
q = discharge

0J Riser Head Discharge:

Head = water level above riser
q = 9.739 * Riser Diameter * Head '' 1.5

Orifice Equation:
q = 3.782 * (Orifice Diameter) ''2 * SQRT(Headr)

@] Rectangular Notch:
b = NotchWidth *- (1- 0.2 * Headr)
where b >= 0.8
q = 3.33 * b * Headr '' 1.5

Sutro:
Wh = Top Width + {(Bottom Width- Top Width)/Notch Height }* Headr
Wd = Bottom Width - Wh (the difference between the bottom and top widths)

Ql = (rectangular notch q where Notch Width = Wh)
Q2 = (rectangular notch q where Notch Width = Wd)

q = Ql + Q2 / 2

V-Notch:
Notch Bottom = height from bottom of riser to bottom of notch
Theta = Notch Angle

a = 2.664261 - 0.0018641 * Theta + 0.00005761 * Theta ''2
b = -0.48875 + 0.003843 * Theta - 0.000092124 * Theta ''2.
c = 0.3392 - 0.0024318 * Theta + 0.00004715 * Theta ''2

YoverH = Headr / (NotchBottom + Headr)
Coef = a + b * Headr + c * Headr ''2

q = (Coef * Tan(Theta / 2)) * (Headr '' (5 / 2))

These equations are provided from the Washington State Department of Ecology's 2005 *Stormwater Management Manual for Western Washington.* The outlet designs are shown

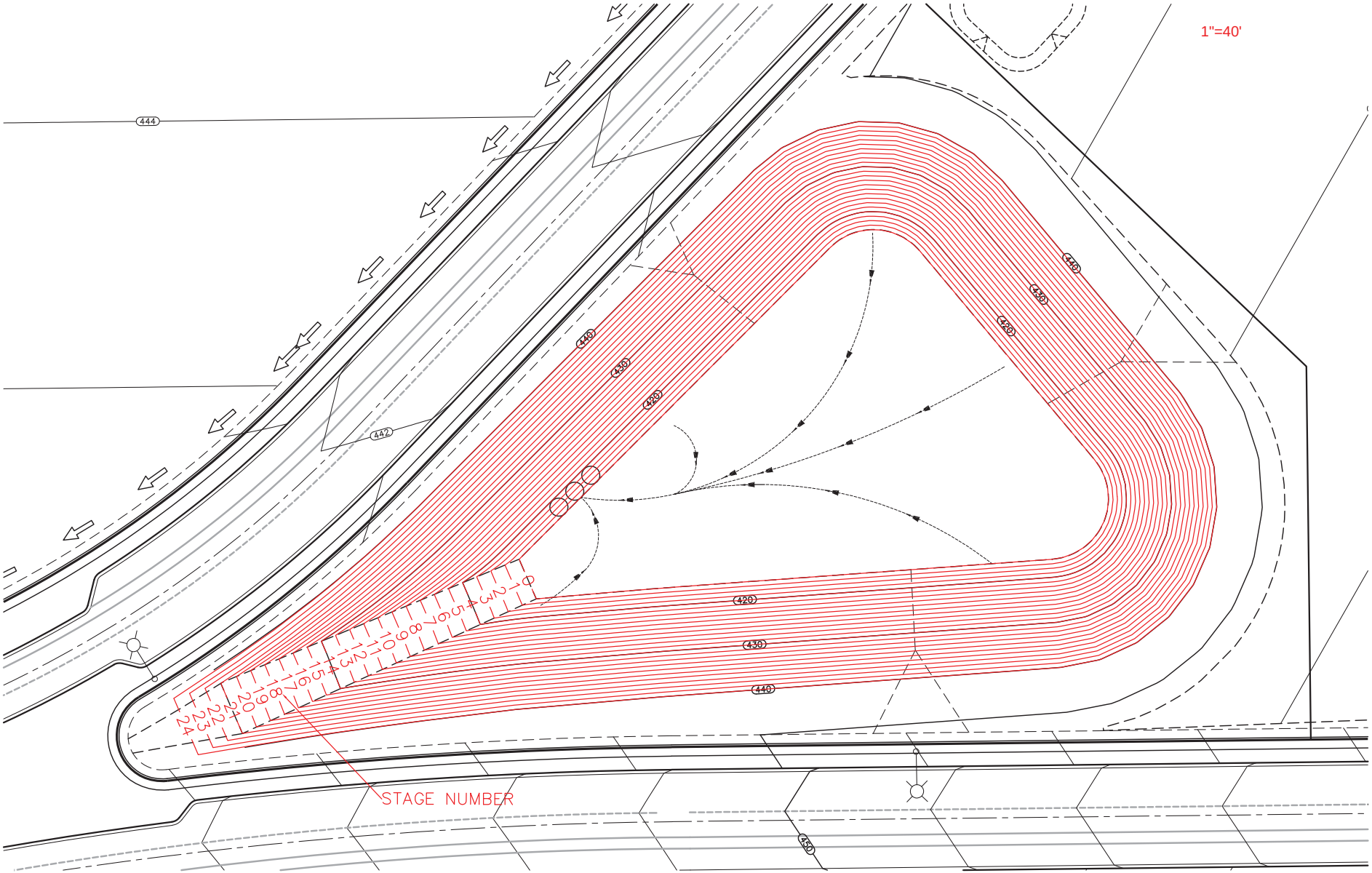
STAGE STORAGE OUTFLOW CALCULATIONS

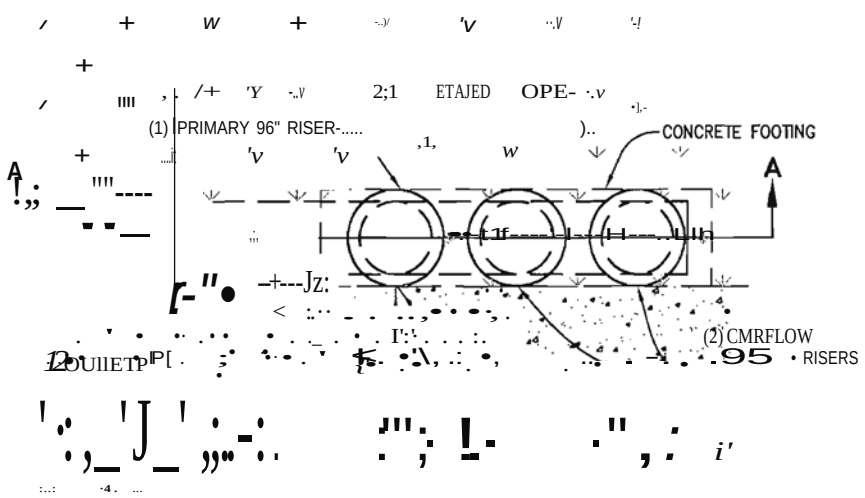
stage	5"@ 0.0	5"@9	5"@9	JO"@ 13	10"@ 15	10"@15	10"@16	10"@16		10"@17	10"@17	10"@17	10"@17	10"@17	10"@17	10"@17	4x5 weir (hxw)		FLOW TOTAL
	Θ	Θ		0	0.000	0.000	0.000	0.000	0.000									0	0.00000
	0.656597			0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0	0.65660
	0.928568			0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0	0.92857
	1.137259			0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0	1.13726
	1.313194			0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0	1.31319
	1.468196			0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0	1.46820
	1.608328			0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			1.60833
	1.737193			0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			1.73719
	1.857137			0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			1.85714
	1.969791	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			1.96979
10	2.076342	0.656597	0.656597	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			3.38954
11	2.177686	0.928568	0.928568	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			4.03482
12	2.274519	1.137259	1.137259	2.626388	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			7.17543
13	2.367395	1.313194	1.313194	3.714274	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			8.70806
14	2.456761	1.468196	1.468196	4.549039	2.626	2.626	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0	15.19497
15	2.54299	1.608328	1.608328	5.252777	3.714	3.714	2.626	2.626	2.626	0.000	0.000	0.000	0.000	0.000	0.000	0.000			26.32014
16	2.626388	1.737193	1.737193	5.872784	4.549	4.549	3.714	3.714	3.714	2.626	2.626	2.626	1.626	2.626	2.626	2.626			50.59917
17	2.707219	1.857137	1.857137	6.433312	5.253	5.253	4.549	4.549	4.549	3.714	3.714	3.714	1.714	3.714	3.714	3.714			63.00739
18	2.785706	1.969791	1.969791	6.948771	5.873	5.873	5.253	5.253	5.253	4.549	4.549	4.549	4.549	4.549	4.549	4.549		16.65	89.67123
19	2.86204	2.076342	2.076342	7.428549	6.433	6.433	5.873	5.873	5.873	5.253	5.253	5.253	5.253	5.253	5.253	5.253		47.09331	128.79100
20	2.936392	2.177686	2.177686	7.879166	6.949	6.949	6.433	6.433	6.433	5.873	5.873	5.873	5.873	5.873	5.873	5.873		86.51593	175.99383
21	3.008906	2.274519	2.214519	8.30537	7.429	7.429	6.949	6.949	6.949	6.433	6.433	6.433	6.433	6.433	6.433	6.433		133.2	229.79991
22	3.079714	2.367395	2.367395	8.710746	7.879	7.879	7.429	7.429	7.429	6.949	6.949	6.949	6.949	6.949	6.949	6.949		201.373	304.58363
23	3.148929	2.456761	2.456761	9.098078	8.305	8.305	7.879	7.879	7.879	7.429	7.429	7.429	7.429	7.429	7.429	7.429		326.0223	435.43091
24	3.216656	2.54299	2.54299	9.469579	8.711	8.711	8.305	8.305	8.305	7.879	7.879	7.879	7.879	7.879	7.879	7.879		487.4372	602.70118

SSD Table Hydraulic Table

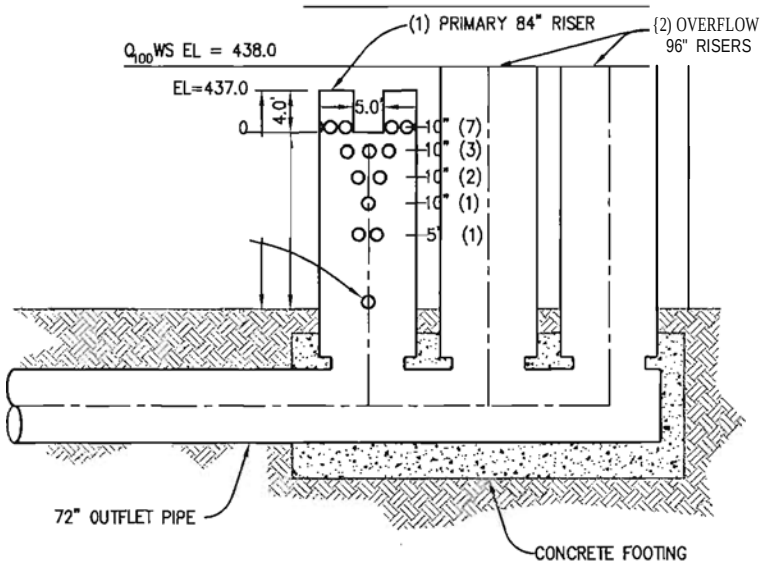
Stage (ft)	Area (ac)	Volume (ac-ft)	Manual	NotUsed	NotUsed	NotUsed	NotUsed
0.000	0.557	0.000	0.000	0.000	0.000	0.000	0.000
1.000	0.590	0.573	0.657	0.000	0.000	0.000	0.000
2.000	0.624	1.180	0.929	0.000	0.000	0.000	0.000
3.000	0.659	1.822	1.137	0.000	0.000	0.000	0.000
4.000	0.695	2.499	1.313	0.000	0.000	0.000	0.000
5.000	0.732	3.212	1.468	0.000	0.000	0.000	0.000
6.000	0.770	3.963	1.608	0.000	0.000	0.000	0.000
7.000	0.808	4.752	1.737	0.000	0.000	0.000	0.000
8.000	0.848	5.580	1.857	0.000	0.000	0.000	0.000
9.000	0.889	6.448	1.970	0.000	0.000	0.000	0.000
10.000	0.930	7.357	3.390	0.000	0.000	0.000	0.000
11.00	0.972	8.309	4.035	0.000	0.000	0.000	0.000
12.00	1.016	9.303	7.175	0.000	0.000	0.000	0.000
13.00	1.060	10.34	8.708	0.000	0.000	0.000	0.000
14.00	1.105	11.42	15.19	0.000	0.000	0.000	0.000
15.00	1.151	12.55	26.32	0.000	0.000	0.000	0.000
16.00	1.198	13.73	50.60	0.000	0.000	0.000	0.000
17.00	1.246	14.95	63.01	0.000	0.000	0.000	0.000
18.00	1.295	16.22	89.67	0.000	0.000	0.000	0.000
19.00	1.345	17.54	128.8	0.000	0.000	0.000	0.000
20.00	1.395	18.91	176.0	0.000	0.000	0.000	0.000
21.00	1.447	20.33	229.8	0.000	0.000	0.000	0.000
22.00	1.501	21.80	304.6	0.000	0.000	0.000	0.000
23.00	1.556	23.33	435.4	0.000	0.000	0.000	0.000

STAGE NO.	AREA (ACRES)	STORAGE(AC-FT) (Using End Area)
0	0.55674705	0
1	0.58991704	0.573332045
2	0.6240099	1.180295515
3	0.65902564	1.821813285
4	0.69496425	2.49880823
5	0.73182573	3.21220322
6	0.76961009	3.96292113
7	0.80831732	4.751884835
8	0.84794742	5.580017205
9	0.8885004	6.448241115
10	0.92997625	7.35747944
11	0.97237497	8.30865505
12	1.01569656	9.302690815
13	1.05994103	10.34050961
14	1.10510838	11.42303432
15	1.15119859	12.5511878
16	1.19821168	13.72589294
17	1.24614765	14.9480726
18	1.29500648	16.21864967
19	1.34478819	17.538547
20	1.39549277	18.90868748
21	1.44711942	20.32999358
22	1.50078879	21.80394768
23	1.55556402	23.33212409
24	1.61144513	24.91562866


1"=40'
444
442
440
430
420
450
STAGE NUMBER



PLAN VIEW
NO SCALE



SECTION A-A
NO SCALE

DETENTION RISER DETAIL

(

SECTION 5

Project: parcel b

Simulation Run: Q2(6HR) Reservoir: Reservoir-1

Start of Run:	01Nov2009, 00:00	Basin Model:	Basin 1
End of Run:	06Nov2009, 00:00	Meteorologic Model:	Q2
Compute Time:	01Aug2011, 10:17:41	Control Specifications:	6 HOUR

Volume Units: IN

Computed Results

Peak Inflow :	245.6 (CFS)	Date/Time of Peak Inflow :	01Nov2009, 04:12
Peak Outflow :	42.6 (CFS)	Date/Time of Peak Outflow :	01Nov2009, 04:50
Total Inflow :	1.08 (IN)	Peak Storage :	13.3 (AC-FT)
Total Outflow :	1.07 (IN)	Peak Elevation :	431.7 (FT)

Project: parcel b

Simulation Run: Q10(6HR) Reservoir: Reservoir-1

Start of Run:	01Nov2009, 00:00	Basin Model:	Basin 1
End of Run:	06Nov2009, 00:00	Meteorologic Model:	Q10
Compute Time:	01Aug2011, 10:20:54	Control Specifications:	6 HOUR

Volume Units: IN

Computed Results

Peak Inflow :	381.5 (CFS)	Date/Time of Peak Inflow :	01Nov2009, 04:12
Peak Outflow :	136.4 (CFS)	Date/Time of Peak Outflow :	01Nov2009, 04:32
Total Inflow :	1.67 (IN)	Peak Storage :	17.8 (AC-FT)
Total Outflow :	1.67 (IN)	Peak Elevation :	435.2 (FT)

Project: parcel b

Simulation Run: Q25(6HR) Reservoir: Reservoir-1

Start of Run:	01Nov2009, 00:00	Basin Model:	Basin 1
End of Run:	06Nov2009, 00:00	Meteorologic Model:	Q25
Compute Time:	01Aug2011, 10:18:24	Control Specifications:	6 HOUR

Volume Units: IN

Computed Results

Peak Inflow :	404.2 (CFS)	Date/Time of Peak Inflow :	01Nov2009, 04:12
Peak Outflow :	157.2 (CFS)	Date/Time of Peak Outflow :	01Nov2009, 04:30
Total Inflow :	1.77 (IN)	Peak Storage :	18.4 (AC-FT)
Total Outflow :	1.77 (IN)	Peak Elevation :	435.6 (FT)

Project: parcel b

Simulation Run: Q50(6HR) Reservoir: Reservoir-1

Start of Run:	01Nov2009, 00:00	Basin Model:	Basin 1
End of Run:	06Nov2009, 00:00	Meteorologic Model:	Q50
Compute Time:	01Aug2011, 10:19:12	Control Specifications:	6 HOUR

Volume Units: IN

Computed Results

Peak Inflow :	493.4 (CFS)	Date/Time of Peak Inflow :	01Nov2009, 04:12
Peak Outflow :	241.2 (CFS)	Date/Time of Peak Outflow :	01Nov2009, 04:26
Total Inflow :	2.16 (IN)	Peak Storage :	20.6 (AC-FT)
Total Outflow :	2.16 (IN)	Peak Elevation :	437.2 (FT)

Project: parcel b

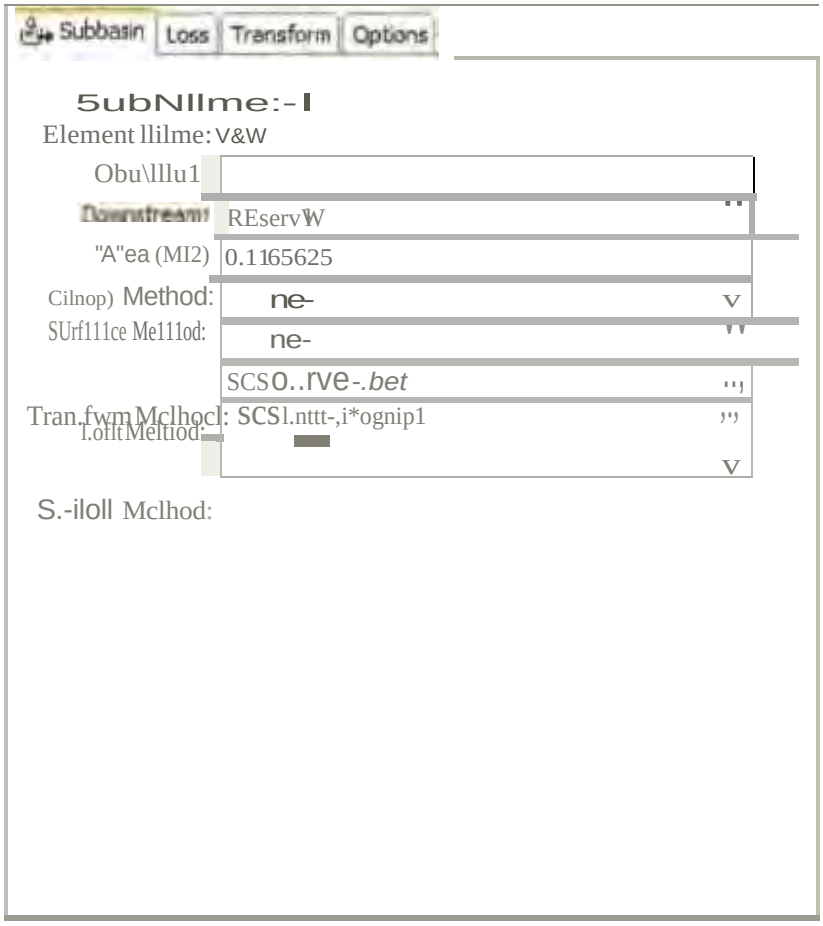
Simulation Run: Q100 (6HR) Reservoir: Reservoir-1

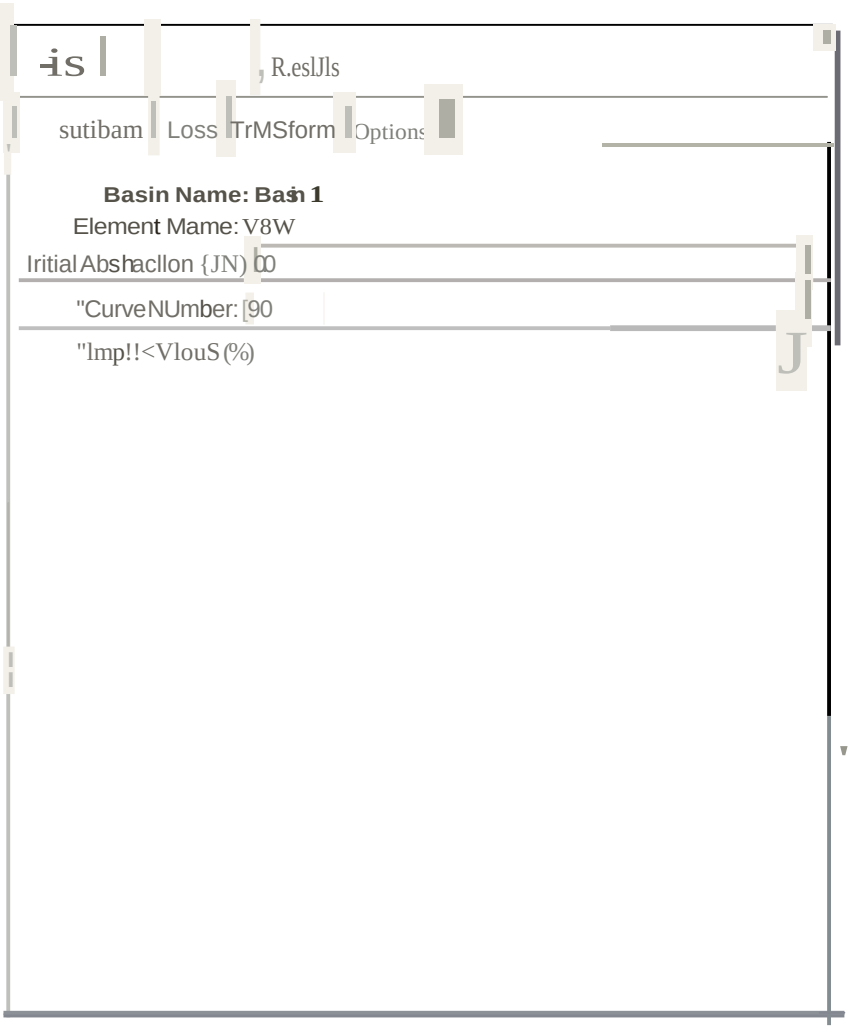
Start of Run:	01Nov2009, 00:00	Basin Model:	Basin 1
End of Run:	06Nov2009, 00:00	Meteorologic Model:	Q100
Compute Time:	28Jun2011, 16:52:12	Control Specifications:	6 HOUR

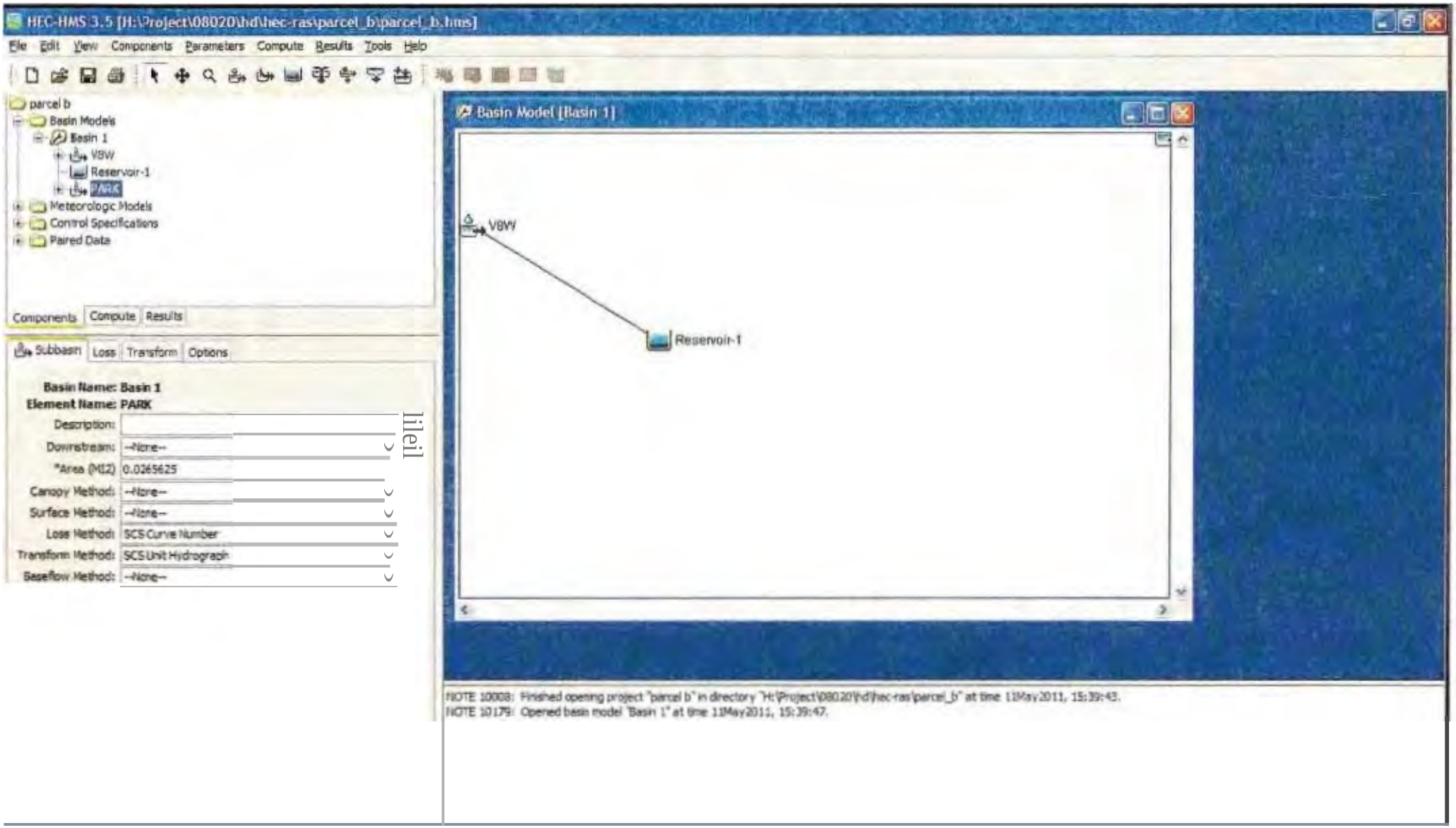
Volume Units: IN

Computed Results

Peak Inflow :	561.7 (CFS)	Date/Time of Peak Inflow :	01Nov2009, 04:12
Peak Outflow :	313.4 (CFS)	Date/Time of Peak Outflow :	01Nov2009, 04:24
Total Inflow :	2.46 (IN)	Peak Storage :	21.9 (AC-FT)
Total Outflow :	2.46 (IN)	Peak Elevation :	438.1 (FT)


Subbasin
Loss
Transform
Options
5ubNIlme:-I
Element llilme: V&W
Obu\lllu1
REservW
"A"ea (MI2)
0.1165625
Cilnop) Method:
ne-
SUrf111ce Me111od:
ne-
SCS0..rve-.bet
Tran.fwmMclhocl: SCS1.nttt-,i*ognip1
I.ofiftMeltiod:
S.-iloll Mclhod:


, R.eslJls
sutibam Loss TrMSform Options
Basin Name: Bas 1
Element Mame: V8W
Iritial Abshaclion {JN) 00
"CurveNUmber: [90
"lmp!!<VlouS (%)


HEC-HMS 3.5 [H:\Project\08020\hd\hec-ras\parcel_b\parcel_b.hms]
File Edit View Components Parameters Compute Results Tools Help
parcel b
Basin Models
Basin 1
V8W
Reservoir-1
PARK
Meteorologic Models
Control Specifications
Paired Data
Components Compute Results
Subbasin Loss Transform Options
Basin Name: Basin 1
Element Name: PARK
Description:
Downstream: --None--
*Area (MI2) 0.0265625
Canopy Method: --None--
Surface Method: --None--
Loss Method: SCS Curve Number
Transform Method: SCS Unit Hydrograph
Baseflow Method: --None--
Basin Model [Basin 1]
V8W
Reservoir-1
NOTE 10008: Finished opening project "parcel b" in directory "H:\Project\08020\hd\hec-ras\parcel_b" at time 11May2011, 15:39:43.
NOTE 10179: Opened basin model "Basin 1" at time 11May2011, 15:39:47.

Appendix J

OTAY VALLEY ROAD OFFSITE FLOWS, BASIN 3, SOUTH EAST SEGMENT

```
 ************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                           Analysis prepared by:



  ************************* DESCRIPTION OF STUDY *************************
 * OTAY LANDS PARCEL B, OTAY VALLEY ROAD OFF SITE FLOW                    *
 * PRELIMINARY PROPOSED HYDROLOGY                                         *
 * Q2                                                                     *
  ************************************************************************

   FILE NAME: 8020A2.DAT
   TIME/DATE OF STUDY: 16:35 01/26/2011
------------------------------------------------------------------------
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
   2003 SAN DIEGO MANUAL CRITERIA

   USER SPECIFIED STORM EVENT(YEAR) =   2.00
   6-HOUR DURATION PRECIPITATION (INCHES) =   1.100
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
   SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.750
   NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
      HALF-   CROWN TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES:  MANNING
      WIDTH   CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 FEET
        as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
     2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
    OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

************************************************************************
   FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  21
------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
   *USER SPECIFIED(GLOBAL):
   STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .7500
   S.C.S. CURVE NUMBER (AMC II) =  70
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
   UPSTREAM ELEVATION(FEET) =    404.00
   DOWNSTREAM ELEVATION(FEET) =    400.00
   ELEVATION DIFFERENCE(FEET) =      4.00
   SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.659
   WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
            THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
            (Reference: Table 3-1B of Hydrology Manual)
            THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
```

```
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.898
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.43
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.43

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    710.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  400.00  DOWNSTREAM ELEVATION(FEET) =  387.00
  STREET LENGTH(FEET) =   730.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =    0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =    0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.21
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    5.34
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.46
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.64
  STREET FLOW TRAVEL TIME(MIN.) =   4.94   Tc(MIN.) =   8.60
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.043
  *USER SPECIFIED(GLOBAL):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  70
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
  SUBAREA AREA(ACRES) =    2.29      SUBAREA RUNOFF(CFS) =    3.51
  TOTAL AREA(ACRES) =      2.49        PEAK FLOW RATE(CFS) =       3.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.66
  FLOW VELOCITY(FEET/SEC.) =  2.66   DEPTH*VELOCITY(FT*FT/SEC.) =   0.80
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =   830.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      2.49  TC(MIN.) =      8.60
  PEAK FLOW RATE(CFS)   =      3.81
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

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              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, OTAY VALLEY ROAD OFF SITE FLOW                    *
* PRELIMINARY PROPOSED HYDROLOGY                                         *
* Q10                                                                    *
 ************************************************************************

  FILE NAME: 8020A10.DAT
  TIME/DATE OF STUDY: 16:38 01/26/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.700
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.750
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH   CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE   FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(GLOBAL):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  70
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    404.00
  DOWNSTREAM ELEVATION(FEET) =    400.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.659
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.479
```

```
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.67
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.67

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    710.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  400.00  DOWNSTREAM ELEVATION(FEET) =  387.00
  STREET LENGTH(FEET) =   730.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =    0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =    0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.49
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.28
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.61
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
  STREET FLOW TRAVEL TIME(MIN.) =   4.65   Tc(MIN.) =   8.31
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.227
  *USER SPECIFIED(GLOBAL):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  70
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
  SUBAREA AREA(ACRES) =    2.29      SUBAREA RUNOFF(CFS) =    5.54
  TOTAL AREA(ACRES) =      2.49        PEAK FLOW RATE(CFS) =       6.03

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =   9.72
  FLOW VELOCITY(FEET/SEC.) =  2.90   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =   830.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      2.49  TC(MIN.) =      8.31
  PEAK FLOW RATE(CFS)   =      6.03
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

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                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, OTAY VALLEY ROAD OFF SITE FLOW                    *
* PRELIMINARY PROPOSED HYDROLOGY                                         *
* Q25                                                                    *
 **************************************************************************

  FILE NAME: 8020A25.DAT
  TIME/DATE OF STUDY: 16:50 01/26/2011
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  25.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.800
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.750
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH   CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE   FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(GLOBAL):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  70
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    404.00
  DOWNSTREAM ELEVATION(FEET) =    400.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.659
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.743
```

```
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.71
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.71

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    710.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  400.00  DOWNSTREAM ELEVATION(FEET) =  387.00
  STREET LENGTH(FEET) =   730.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.71
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.53
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
  STREET FLOW TRAVEL TIME(MIN.) =   4.60   Tc(MIN.) =   8.26
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.432
  *USER SPECIFIED(GLOBAL):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  70
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
  SUBAREA AREA(ACRES) =    2.29      SUBAREA RUNOFF(CFS) =    5.89
  TOTAL AREA(ACRES) =      2.49        PEAK FLOW RATE(CFS) =       6.41

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.04
  FLOW VELOCITY(FEET/SEC.) =  2.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.00
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =   830.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      2.49  TC(MIN.) =      8.26
  PEAK FLOW RATE(CFS)   =      6.41
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

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                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                           Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, OTAY VALLEY ROAD OFF SITE FLOW                    *
* PRELIMINARY PROPOSED HYDROLOGY                                         *
* Q50                                                                    *
 ************************************************************************

  FILE NAME: 8020A50.DAT
  TIME/DATE OF STUDY: 17:01 01/26/2011
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.750
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH   CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE   FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(GLOBAL):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  70
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    404.00
  DOWNSTREAM ELEVATION(FEET) =    400.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.659
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.796
```

```
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.87
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.87

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    710.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  400.00  DOWNSTREAM ELEVATION(FEET) =  387.00
  STREET LENGTH(FEET) =   730.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.47
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   4.43   Tc(MIN.) =   8.09
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.249
  *USER SPECIFIED(GLOBAL):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  70
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
  SUBAREA AREA(ACRES) =    2.29      SUBAREA RUNOFF(CFS) =    7.30
  TOTAL AREA(ACRES) =      2.49        PEAK FLOW RATE(CFS) =       7.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.05
  FLOW VELOCITY(FEET/SEC.) =  3.09   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =   830.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      2.49  TC(MIN.) =      8.09
  PEAK FLOW RATE(CFS)   =      7.94
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1508

                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OTAY LANDS PARCEL B, OTAY VALLEY ROAD OFF SITE FLOW                    *
* PRELIMINARY PROPOSED HYDROLOGY                                         *
* Q100                                                                   *
 **************************************************************************

  FILE NAME: 8020A100.DAT
  TIME/DATE OF STUDY: 16:08 01/26/2011
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.750
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH   CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(GLOBAL):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  70
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    404.00
  DOWNSTREAM ELEVATION(FEET) =    400.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.659
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.587
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.99
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.99

****************************************************************************
 FLOW PROCESS FROM NODE    705.00 TO NODE    710.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  400.00  DOWNSTREAM ELEVATION(FEET) =  387.00
 STREET LENGTH(FEET) =   730.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =    0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =    0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.25
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =    9.09
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.81
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.91
 STREET FLOW TRAVEL TIME(MIN.) =   4.32   Tc(MIN.) =   7.98
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.871
 *USER SPECIFIED(GLOBAL):
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =  70
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
 SUBAREA AREA(ACRES) =    2.29      SUBAREA RUNOFF(CFS) =    8.37
 TOTAL AREA(ACRES) =      2.49        PEAK FLOW RATE(CFS) =       9.10

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.76
 FLOW VELOCITY(FEET/SEC.) =  3.18   DEPTH*VELOCITY(FT*FT/SEC.) =   1.19
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =   830.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      2.49  TC(MIN.) =      7.98
 PEAK FLOW RATE(CFS)   =      9.10
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Appendix K

By selecliog I.he apptopriale nolcb !yJ)C the user is Lhen given the option to enter the appropriate nolch type dimensions.

Riser and orifice equations used in SDIDvf are provided below.

Headr = the waler height over tbe notch/orifice bottom.
q = discLarge

[TI Riser Head Discbarge:

Head = waler level above riser
q = 9.739 *Riser Diameter *Bead " 1.5

Ori fice Equation:
q=3.782*(Orifice Diameter)"'2*SQRT(Headr)

Rectnngular Notch:
b =NotchWicHLI *-(1-0.2*Headr)
where b >= 0.8
q= 3.33 • b * Headr "' 1.5

Sulro:
Wb = Top Width + {(Bollom Wid th- Top Wi<llli)/Notch Hcighl }* Headr
W<l = Bollom Width - Wh (lhe diffei encc between the bollom aud 10tl widths)

Ql = (recta11gnlar notch q where Notch Width = Wh)
Q2 = (rectaognlar notch q where Notch Width = Wd)

q = Ql + Q2 / 2

V-Notch:
Notch Bollom = height from bottom of riser to bottom of notch
Theta = Notch Angle

a = 2.664261 -.0.0018641**Tbela +0.00005761**Theta "2 Tlieta -0.000092124** Tlieta A2.
b=--0.48875+0.003843
c=0.3392-0.0024318*Theta+0.00004715•Theta"'2

YoverH=He.adr/(NotchBollom+Heatlr)
Coef = a + b * Headr + c ... Hea<lr "2

q=(Coef*Tau(fhetn/2))>t-(Headr A(5/2))

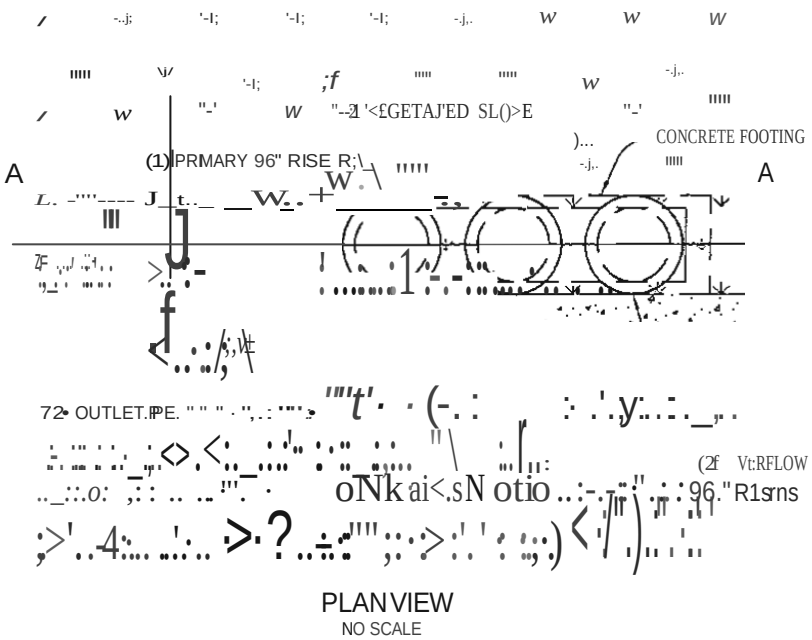
These equalions are provided from the Washington Stale Deparlm.ent of Ecology's 2005 *Stonnwater Management lvfanual for Western Washington.* The outlet designs are shown

STAGE STORAGE OUTFLOW CALCULATIONS

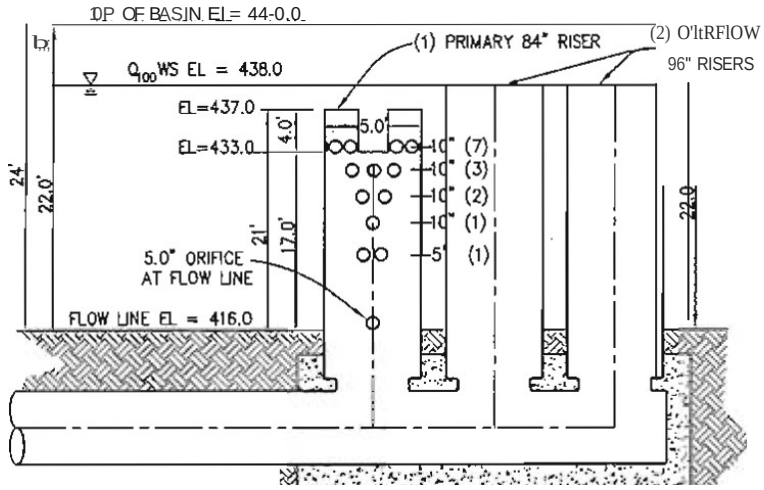
st<lgt	S"@ 00	S"@9	5"@9	JO"@ 13	10"@ l'i	lO"IP15	10'@16	10"@16	o	10 @17	lO.@17	10"@17	10'1!'17	10"@17	ICl"@J7	10"@17	•XS wer (n<w)		FlrTN ror.>l
	0			0	0000	0.000	0.000	0.000	0.000									0	000000
	0.656597			0	0000	0000	0.000	0.000	0000	0000	0.000	0.000	0.000	0..000	0.000	0.000		0	05660
	0.928561>			0	0000	0.000	0.000	0.000	0000	0.000	0.000	0000	0.000	0.000	0.000	0.000		0	o.92157
	1.137159			0	0.0C0	0.000	0.000	0000	0000	0000	0.000	0.0000	0000	0)0(J	0.000	0.000		0	1.13726
	1.313 19'			0	0.000	D.000	0.000	0000	0000	0.000	0.000	0000	D.000	0.000	0.000	0.000		0	131319
	1.468196			0	.0.000	0.000	0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0000			1.46820
6	160SJ28			0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0000	0.000	0.000	0.000	0.000			1.60633
7	1.7371.93			0	0.000	0.000	0.000	0.000	0.000	0.000	0000	0.000	0.000	0000	0.000	0.000		0	73719
8	1.857137				0.000	0000	0000	0.000	0.000	0.000	0000	0.000	0.000	0.000	0000	0.000		0	1 &5714
9	J..J169791	0	0		0.000	0..000	0000	0.000	0.000	0.000	0000	0.000	0.000	0.000	0.000	0.000		0	1.96979
10	2.076342	0.656597	0656597	0	0000	0.000	0000	0.000	0.000	0.000	0000	0.000	0.000	0.000	0.000	0.000		0	311954
11	2.l77686	0.928568	0.928568	0	0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0	4.03421
12	2.274519	1.137259	1.137259	2.GI038$	0.000	0.000	0000	0.000	0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0	7.1754
13	2.367395	1.3B19'	1.313194	3.714274	0.000	0.000	0.000	0.000	0000	0.000	0.000	0.000	0000	0.000	0.000	0.000		0	8.70506
14	2.456761	1..168196	1468196	4.549039	2.62.6	Z.626	0.000	0000	0.000	0.000	0000	0.000	0.000	0.000	0ti00	0.000		0	LS9497
15	2.542.99	1.608328	l.60832B	5Z.527n	l.714	3.714	UZ.6	2.626	2.626	0.000	0.000	0.000	0.000	0.000	0.000	0.000	D		26.32014
16	2.626388	1.737193	1737193	S.872784	4.5•9	4.S49	l.714	3n•	J.714	2.6.1.6	2-626	2.626	2.626	2.626	2.626	2.626			50.59!117
17	2.70n19	J857U7	l.8S7137	6433312	S.253	S.253	4.549	4.549	4.549	3.71.4	3.714	37!4	3.714	3.71.-4	3.714	3.714			6J.00739
18	2.785706	1..969791	l.969791	6.948771	ss11	S873	S.253	S.253	S.253	4.549	4$49	4.549	H49	4.5•9	C.549	4.549		16.65	89.67U3
19	2.86204	2.076342	2.076342	7.428549	6.433	6.433	5.1!73	5.873	S.873	5253	5.253	S.253	i.253	S.253	S.253	5.253		•709331	128.79100
20	2.936392	2.177686	2.177686	7879166	6.949	6.1149	6433	6433	6.433	S.873	Slf73	S.873	5.873	S.873	S.873	5.873		865LS93	175.99383
21	3.0011906	2.274519	2.2'4519	8.30S37	7.429	7.429	6.949	6.949	6.949	6.433	6.433	6.433	6.433	6D3	6.433	6.433		13..Z	229.79991
22	J.079714	2.367395	2.367395	8.710746	7879	7.879	7429	7.42'	7.<29	6.949	6.949	6.949	6.949	6.949	6.949	6.949		201-373	300.58363
23	3.ld89i9	2.456761	2.456761	9098078	8.305	8.305	7.879	7879	7.879	7429	7,429	7429	7.429	7A29	7.429	7.429		326.0223	435.43091
24	3.2166	2.542.99	2..54299	9.469579	8.7U	8711	8.30)	8805	8.305	7ff/9	7.879	7.879	7.$79	7.879	7879	7.879		•87.43n	602.70118

SSD Table Hydraulic Table

Stage (ft)	Area (ac)	Volume (ac-ft)	Manual	NotUsed	NotUsed	NotUsed	NotUsed
0.000	0.557	0.000	0.000	0.000	0.000	0.000	0.000
1.000	0.590	0.573	0.657	0.000	0.000	0.000	0.000
2.000	0.624	1.180	0.929	0.000	0.000	0.000	0.000
3.000	0.659	1.822	1.137	0.000	0.000	0.000	0.000
4.000	0.695	2.499	1.313	0.000	0.000	0.000	0.000
5.000	0.732	3.212	1.468	0.000	0.000	0.000	0.000
6.000	0.770	3.963	1.608	0.000	0.000	0.000	0.000
7.000	0.808	4.752	1.737	0.000	0.000	0.000	0.000
8.000	0.848	5.580	1.857	0.000	0.000	0.000	0.000
9.000	0.889	6.448	1.970	0.000	0.000	0.000	0.000
10.000	0.930	7.357	3.390	0.000	0.000	0.000	0.000
11.00	0.972	8.309	4.035	0.000	0.000	0.000	0.000
12.00	1.016	9.303	7.175	0.000	0.000	0.000	0.000
13.00	1.060	10.34	8.708	0.000	0.000	0.000	0.000
14.00	1.105	11.42	15.19	0.000	0.000	0.000	0.000
15.00	1.151	12.55	26.32	0.000	0.000	0.000	0.000
16.00	1.198	13.73	50.60	0.000	0.000	0.000	0.000
17.00	1.246	14.95	63.01	0.000	0.000	0.000	0.000
18.00	1.295	16.22	89.67	0.000	0.000	0.000	0.000
19.00	1.345	17.54	128.8	0.000	0.000	0.000	0.000
20.00	1.395	18.91	176.0	0,000	0.000	0.000	0.000
21.00	1.447	20.33	229.8	0.000	0.000	0.000	0.000
22.00	1.501	21.80	304.6	0.000	0.000	0.000	0.000
23.00	1.556	23.33	435.4	0.000	0.000	0.000	0.000



PLAN VIEW
NO SCALE



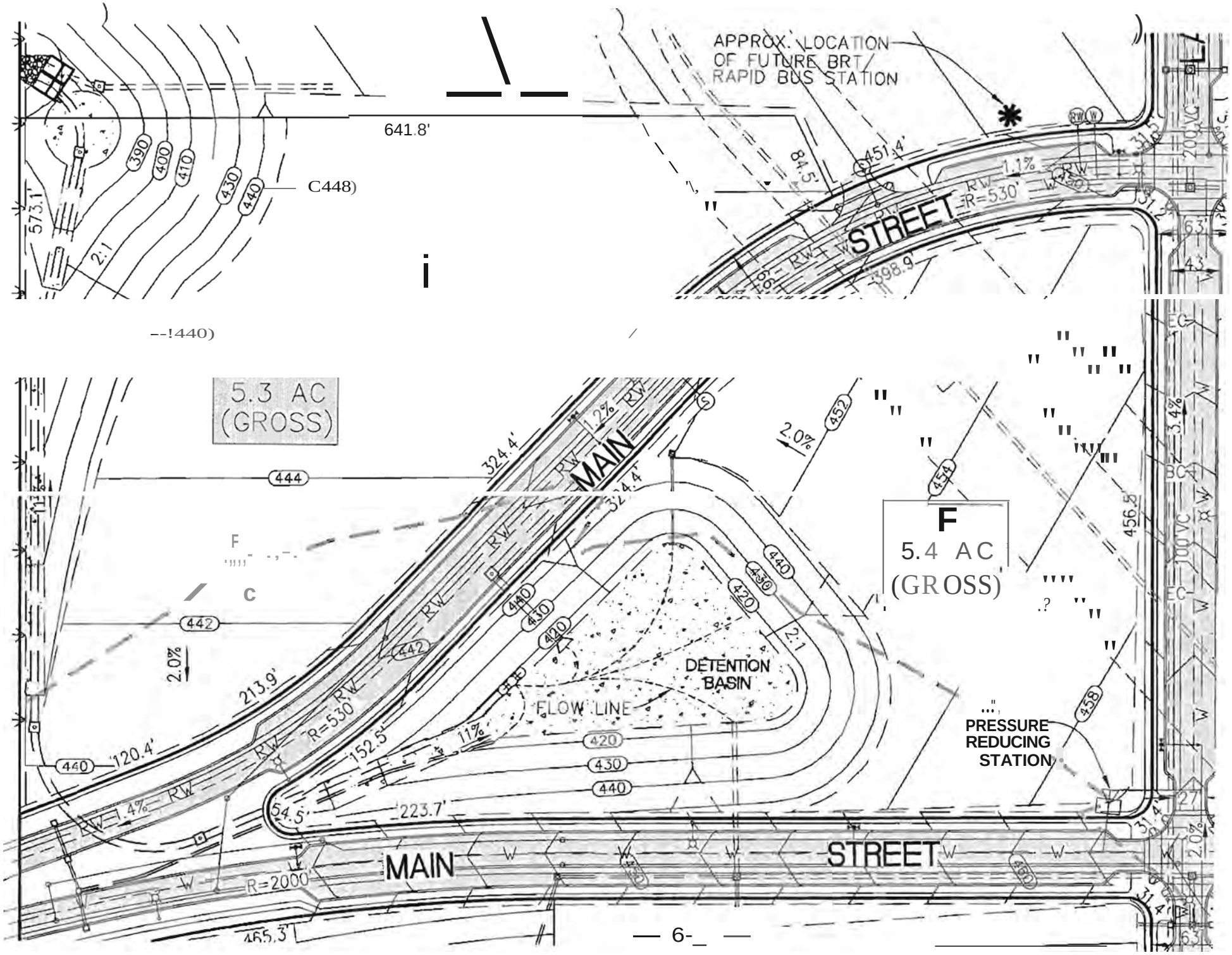
SECTION A-A
HO SCALE

DETENTION RISER DETAIL

(

(

C


APPROX. LOCATION
OF FUTURE BRT/
RAPID BUS STATION
641.8'
C448)
573.1'
2:1
390
400
410
430
440
84.5'
451.4'
1.1%
RW
W
STREET
R=530'
398.9
200 VC
63
43
--!440)
5.3 AC
(GROSS)
324.4'
444
1.2%
MAIN
2.0%
452
454
F
5.4 AC
(GROSS)
456.5
100 VC
3.4%
442
213.9'
R=530'
120.4'
440
420
DETENTION
BASIN
FLOW LINE
152.5'
11%
54.5'
223.7'
458
PRESSURE
REDUCING
STATION
1.4%
R=2000'
455.3'
27
2.0%
63

Project: parcel b

Simulation Run: Q2(6HR) Reservoir: Reservoir-I

Start of Run:	01Nov2009, OO:OO	Basin Model:	Basin 1
End of Run:	06Nov2009, 00:00	Meteorologic Model:	Q2
Compute Time:	01Aug2011, 10:17:41	Control Specifications:	6 HOUR

Volume Units: IN

Computed Results

Peak Inflow :	245.6 (CFS)	Daleffime of Peak Inflow :	01Nov2009, 04:12
Peak Outflow :	42.6 (CFS)	Date!Tirne of Peak Outflow :	01Nov2009, 04:50
Total Inflow :	1.08 (IN)	Peak Storage :	13.3 (AC-FT)
Tola! Outflow :	1.07 (IN)	Peak Elevation :	431.7 (FT)

Project: parcel b

Simulation Run: 010(6HR) Reservoir: Reservoir-1

Start of Run:	01Nov2009, OO:OO	Basin Model:	Basin 1
End of Run:	06Nov2009, 00:00	Meleorologic Model:	010
Compule Time:	01Aug2011, 10:20-.54	Control Specitications:	6H::>UR

Volume Units: IN

Computed Results

Peak Inflow:	381.5 (CFS)	Datemme of Peak Inflow:	01Nov2009. 04:12
Peak Outflow:	136.4 (CFS)	Date/Time *of* Peak Outflow:	·01Nov2009, 04:32
Total Inflow:	1.67 (IN)	Peak Storage:	17.8 (AC·Fl)
Total Outflow:	1.67 (IN)	Peak Elevation:	435.2 (F"l

Project: parcelb

Simulation Run: 025(6HR} Reservoir: Reservoir-1

Start of Run:	01Nov2009; 00:00	Basin Mode!:	Basin 1
End of Run:	06Nov2009, 00:00	Meteorologic Model:	025
Compute Time:	01Aug2011, 10:18:24	Control Specifications:	6 HOUR

Volume Units: IN

Computed Results

Peak Inflow:	404.2 (CFS)	Date/Time of Peak Inflow:	01Nov2009. 04:12
Peak Outflow:	157.2 (CFS)	DatefTime or Peak Outflow:	01Nov2009, 04:30
Total Inflow:	1.77 (IN)	Peak Storage:	18.4 (AC-FD
Tolat Outflow:	1.77 (IN)	Peak Elevation:	435.6 (FT)

Project: parcel b

Simulation Run: QS0(6HR) Reservoir: Reservoir-1

Start of Run:	01Nov2009, 00:00	Basin Model:	Basin 1
End of Run:	06Nov2009, 00:00	Meteorologic Model:	050
Compute Time:	01Aug2011, 10:19:12	Control Specifications:	6 HOUR

Volume Units: IN

Computed Results

Pesk Inflow ;	493.4 (CFS)	Date/Time or Peak Inflow :	01Nov2009, 04:12
Peak Oulflow :	241.2 (CFS)	Date/Time of Peak. Outflow :	01Nov2009, 04:26
Total Innow :	2.16 (IN)	Peak Storage :	20.6 (AC-FT)
Total Outflow :	2.16 (IN)	Peak. Elevation :	437.2 (Fl)

Project: parcel b

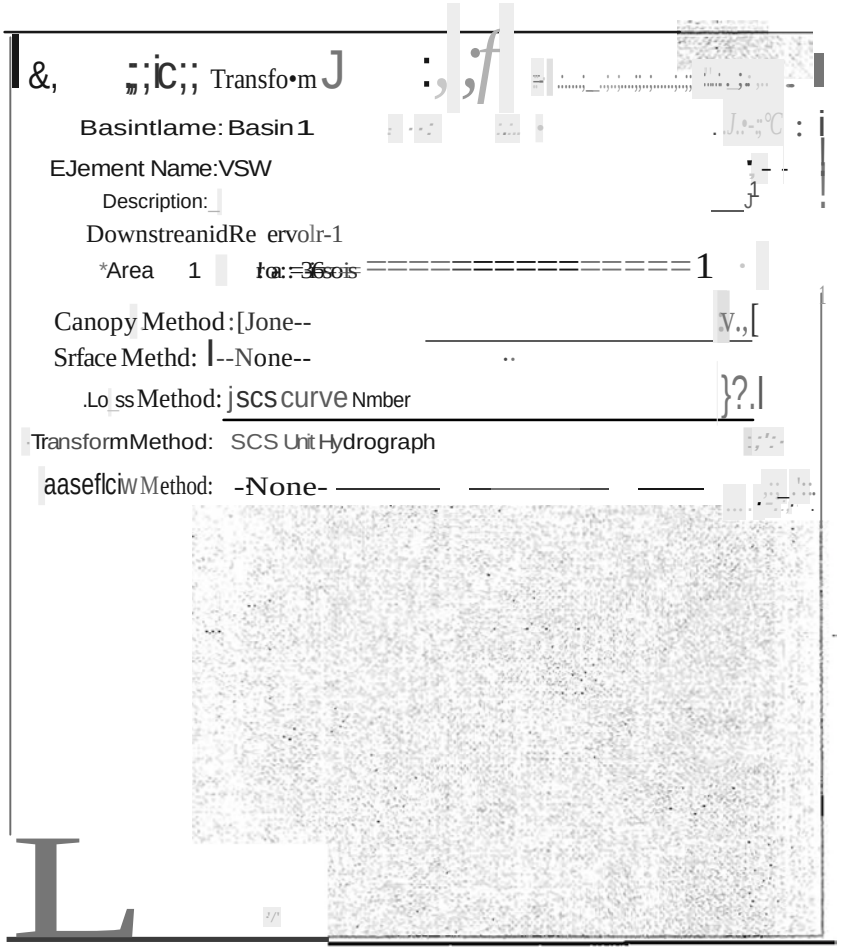
Simulation Run: 0100 (6HR) Reseriloir: Reservoir-1

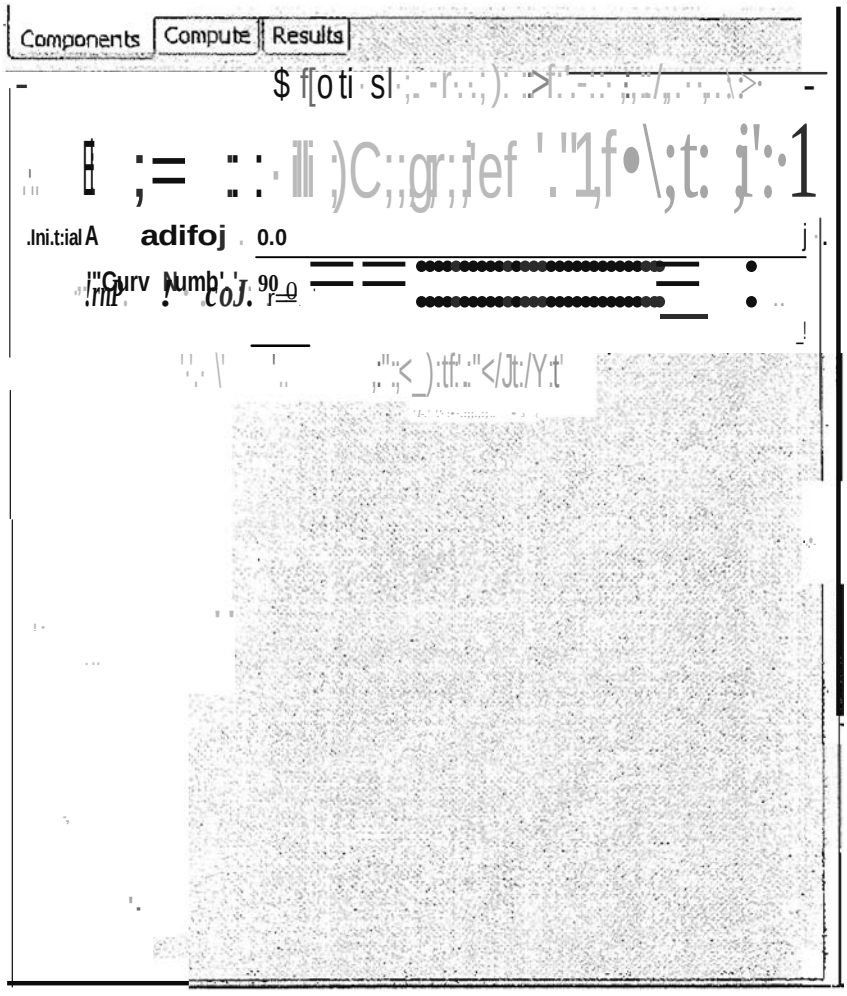
Start of Run:	01Nov2009, 00:00	Basin Model:	Basin 1
End of Run:	06Nov2009, 00:00	Meteorologic Model:	0100
Compute Time:	28Jun2011, 16:52:12	Control Specifications:	6 HOUR

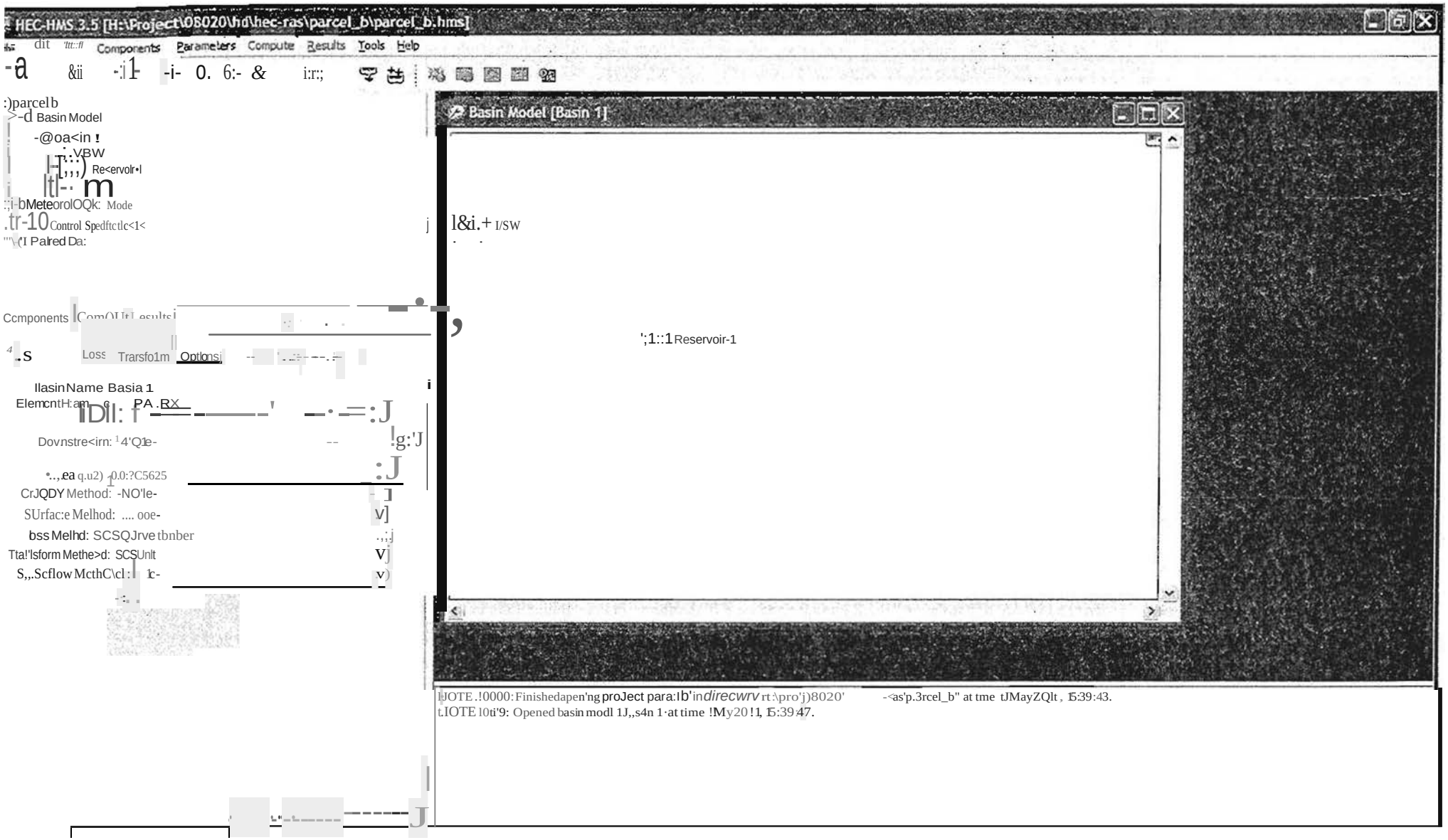
Volume Units: IN

Computed Results·

Peak Inflow :	561.7 (CFS)	Date/Time of Peak Inflow :	01Nov2009, 04:12
Peak Outflow :	313.4 (CFS)	Date/Time of Peak Outflow :	01Nov2009, 04:24
Total !nOow :	2.46 (IN)	Peak Storage :	21.9 (AC-FT)
Total Outflow :	2.46 (IN)	Peak Elevation :	438.1 (FD

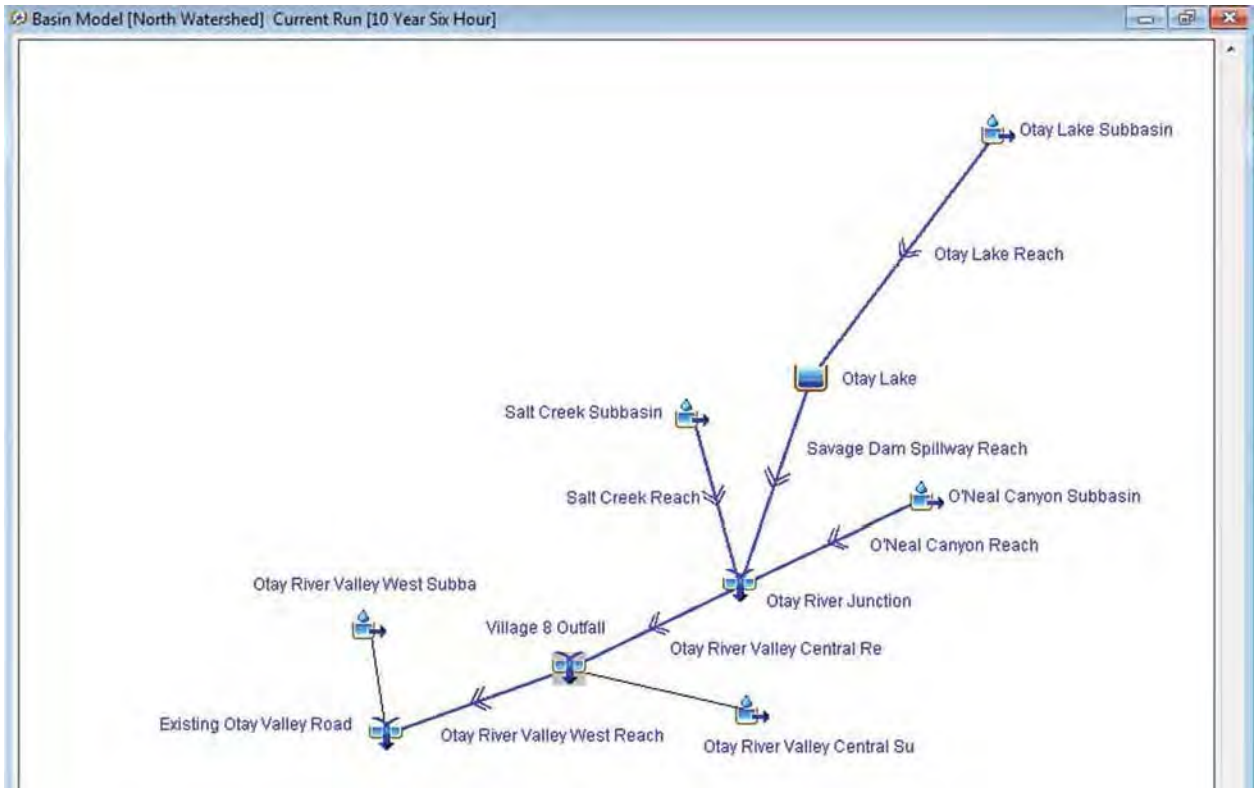

Transfo•m
Basintlame: Basin 1
EJement Name:VSW
Description:
DownstreanidRe ervolr-1
*Area 1
Canopy Method: [Jone--
Srface Methd: --None--
Lo ss Method: jSCS curve Nmber
TransformMethod: SCS Unit Hydrograph
aaseflciW Method: -None-

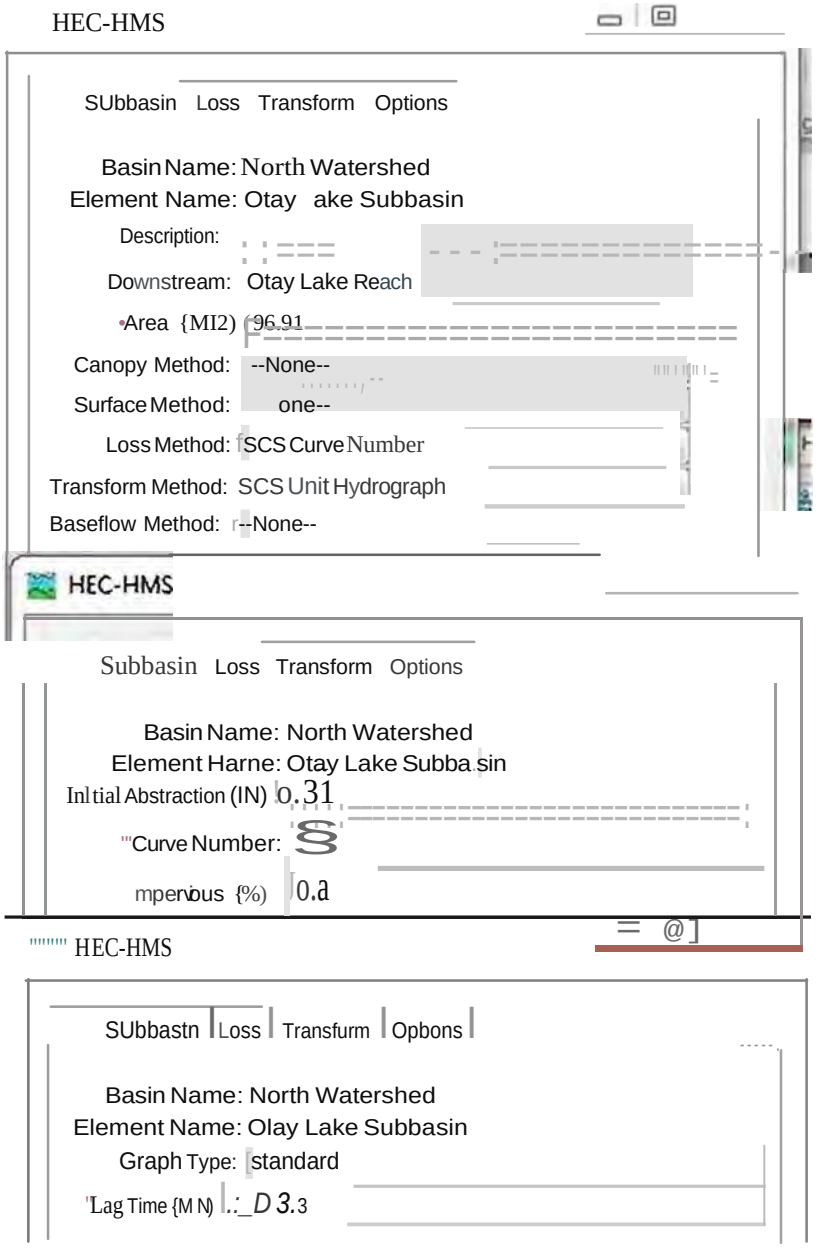

Components
Compute
Results
adifoj
0.0

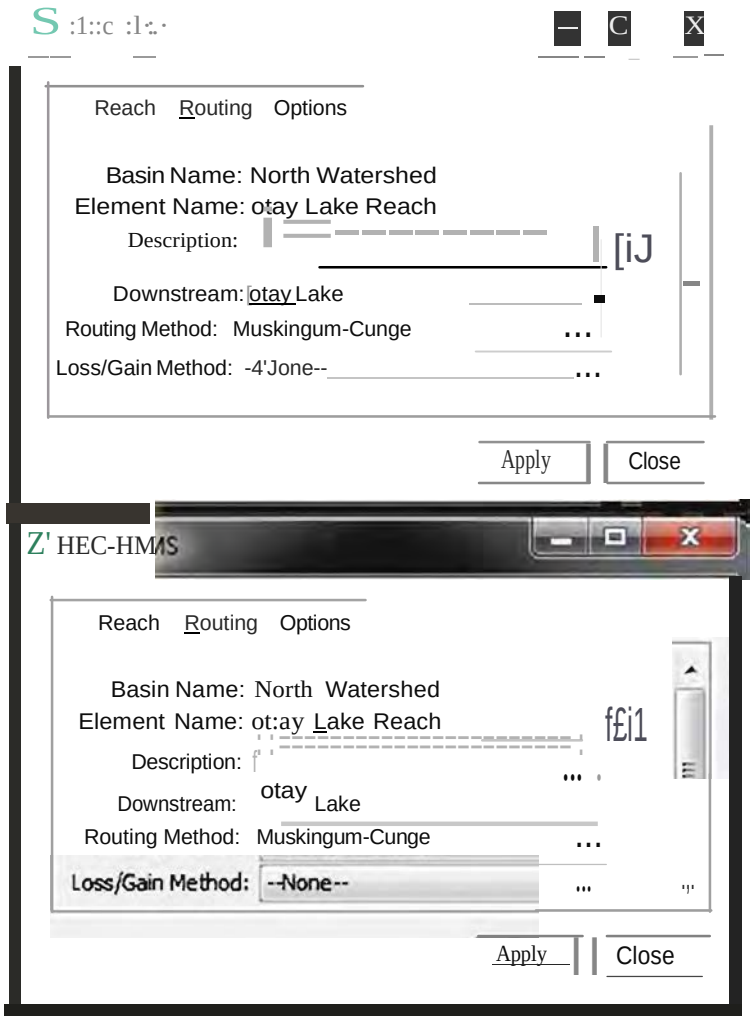

HEC-HMS 3.5 [H:\Project\08020\hd\hec-ras\parcel_b\parcel_b.hms]
Components
Parameters
Compute
Results
Tools
Help
Basin Model [Basin 1]
Reservoir-1
Basin Model
Control Specifications
Paired Data
Components
Loss
Transform
Options
Basin Name Basin 1
Element Name
Downstream:
Method:
Surface Method:
Loss Method:
Transform Method:
Flow Method:
NOTE .!0000: Finished opening project parcel_b" in directory \project\08020'
NOTE 10ti'9: Opened basin model 1J,,s4n 1 at time !May20!1, 15:39:47.

Appendix L

Otay River Valley Proposed Condition HEC HMS Analysis




HEC-HMS
SUbbasin Loss Transform Options
Basin Name: North Watershed
Element Name: Otay ake Subbasin
Description:
Downstream: Otay Lake Reach
•Area {MI2) 96.91
Canopy Method: --None--
Surface Method: one--
Loss Method: SCS Curve Number
Transform Method: SCS Unit Hydrograph
Baseflow Method: --None--
HEC-HMS
Subbasin Loss Transform Options
Basin Name: North Watershed
Element Harne: Otay Lake Subba sin
Inltial Abstraction (IN) 0.31
Curve Number:
mpervious {%) 0.a
HEC-HMS
SUbbastn Loss Transfurm Opbons
Basin Name: North Watershed
Element Name: Olay Lake Subbasin
Graph Type: standard
Lag Time {M N) D 3.3


Reach Routing Options
Basin Name: North Watershed
Element Name: otay Lake Reach
Description:
Downstream: otay Lake
Routing Method: Muskingum-Cunge
Loss/Gain Method: -4'Jone--
Apply
Close
HEC-HMS
Reach Routing Options
Basin Name: North Watershed
Element Name: otay Lake Reach
Description:
Downstream: otay Lake
Routing Method: Muskingum-Cunge
Loss/Gain Method: --None--
Apply
Close

Otay Ranch University Villages-Otay River Analysis
Otay Lake Subbasin & Reach

Proposed Conditions

DRAINAGE AREA	62024.0 acres	96.913 mi;.i

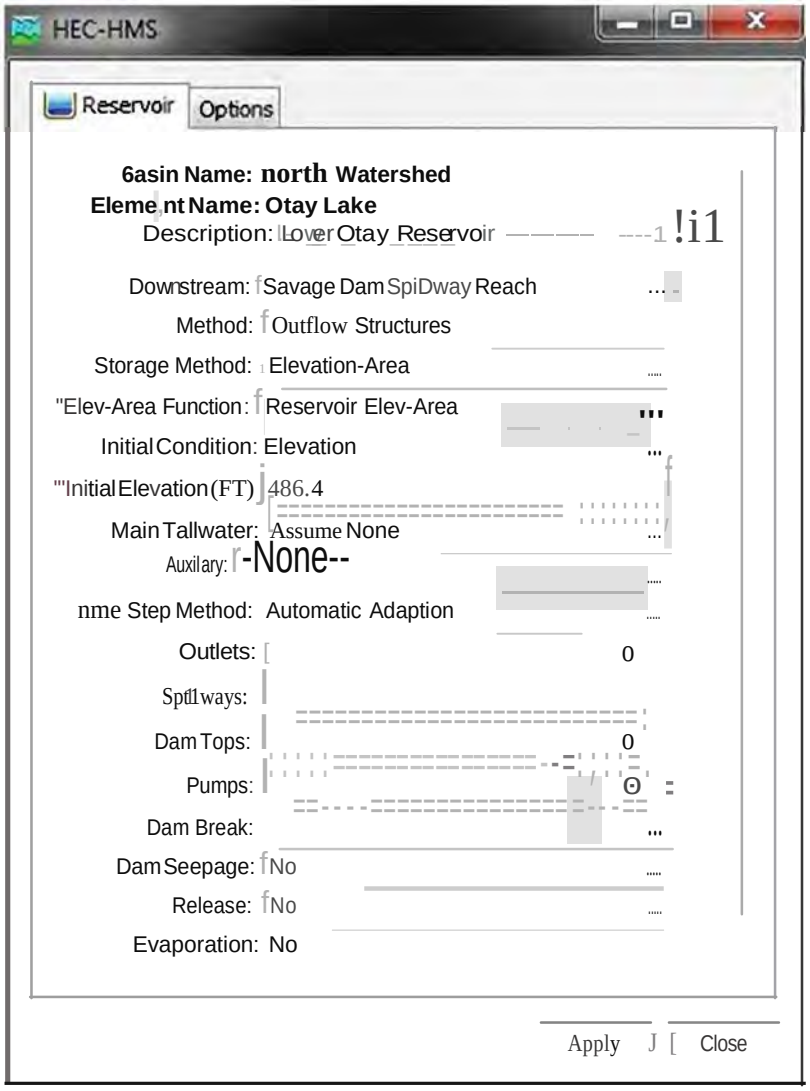
98	0	acres	(Major Arterials}
92	0	acres	(Commercial Development)
91	0	acres	(Mixed Use - Schools, Hospital}
90	0	acres	(High Density Residential Development)
87	1024	acres	(Single-Family Residential Development)
81	61000	acres	(Open Space)

CURVE NUMBER = 81.1 IAMC=2.0
86.5 AMC=2.5

Average n	0.035	
m	0.38	
L	13.51	miles
Le	6.755	miles
U S Elev.	3060	feet
D/S Elev.	486.4	feet
S	190	fl/mile

LAG TIME = 1.722 hours
103.3 min

SOIL GROUP D ASSUMED


HEC-HMS
Reservoir
Options
6asin Name: north Watershed
Eleme nt Name: Otay Lake
Description: Lower Otay Reservoir
Downstream: Savage Dam SpiDway Reach
Method: Outflow Structures
Storage Method: Elevation-Area
"Elev-Area Function: Reservoir Elev-Area
Initial Condition: Elevation
'"Initial Elevation (FT) 486.4
Main Tallwater: Assume None
Auxilary: -None--
nme Step Method: Automatic Adaption
Outlets: 0
Spt1ways:
Dam Tops: 0
Pumps:
Dam Break:
Dam Seepage: No
Release: No
Evaporation: No
Apply
Close

Reservoir | Spill•Nay | Options |

Basin Name: Horth Watershed

Element Name: Otay Lake

Method: Broad-crested Spillway

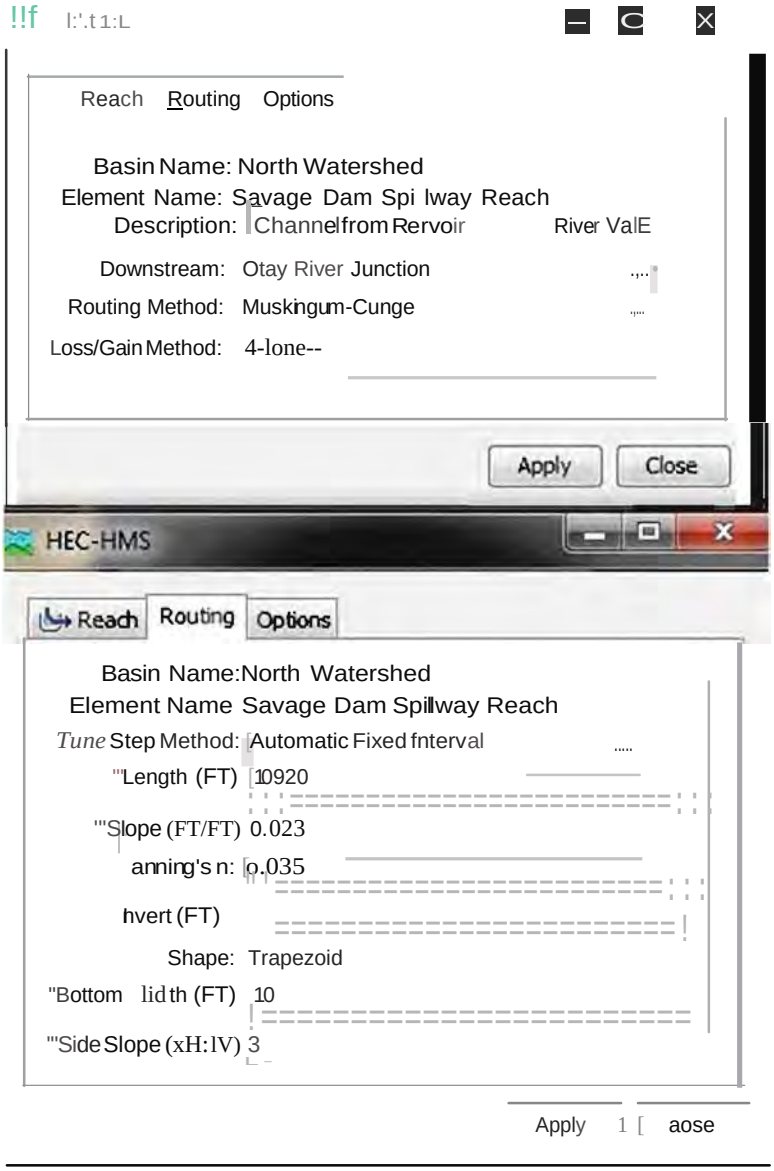
Direction: [Main

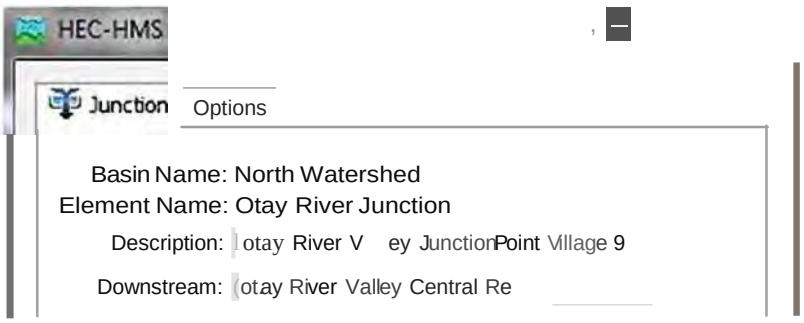
'"Elevation (FT) [486.4

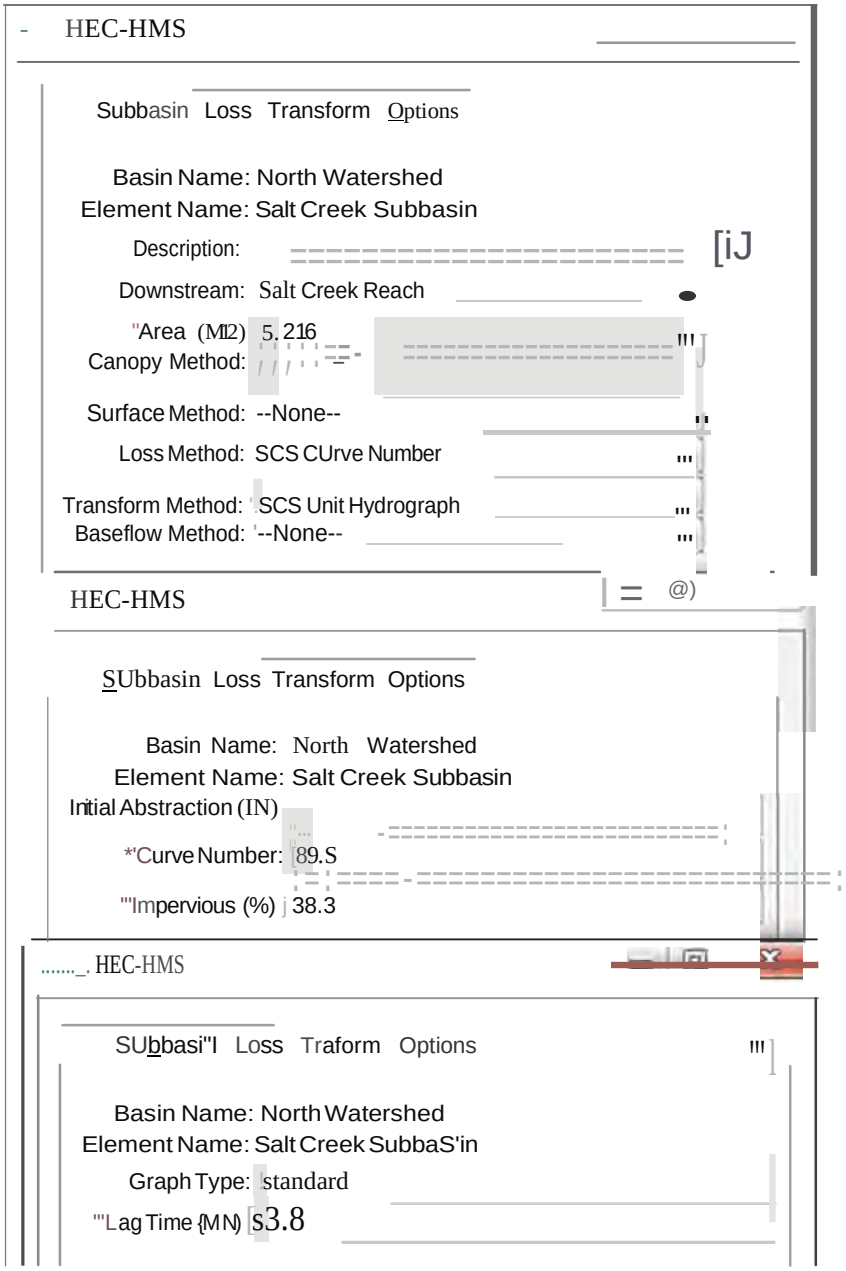
"length (FT) @6

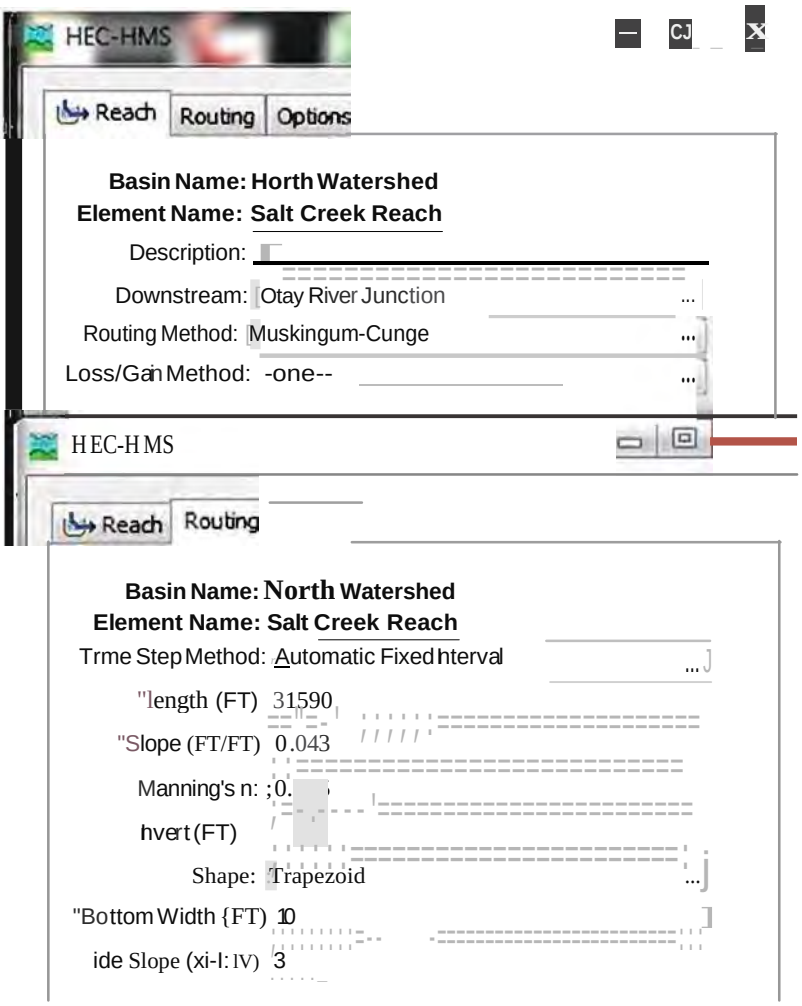
•coefficient: 3.0

Gates: [O


Reach Routing Options
Basin Name: North Watershed
Element Name: Savage Dam Spillway Reach
Description: Channel from Rervoir River Valley
Downstream: Otay River Junction
Routing Method: Muskingum-Cunge
Loss/Gain Method: 4-lone--
Apply
Close
HEC-HMS
Reach
Routing
Options
Basin Name: North Watershed
Element Name Savage Dam Spillway Reach
Tune Step Method: Automatic Fixed fnterval
Length (FT) 10920
Slope (FT/FT) 0.023
anning's n: o.035
hvert (FT)
Shape: Trapezoid
Bottom lid th (FT) 10
Side Slope (xH:lV) 3
Apply
aose


HEC-HMS
Junction
Options
Basin Name: North Watershed
Element Name: Otay River Junction
Description: otay River V ey Junction Point Village 9
Downstream: otay River Valley Central Re


HEC-HMS
Subbasin Loss Transform Options
Basin Name: North Watershed
Element Name: Salt Creek Subbasin
Description:
Downstream: Salt Creek Reach
Area (MI2) 5.216
Canopy Method:
Surface Method: --None--
Loss Method: SCS CUrve Number
Transform Method: SCS Unit Hydrograph
Baseflow Method: --None--
HEC-HMS
SUbbasin Loss Transform Options
Basin Name: North Watershed
Element Name: Salt Creek Subbasin
Initial Abstraction (IN)
Curve Number: 89.S
Impervious (%) 38.3
HEC-HMS
SUbbasi"I Loss Traform Options
Basin Name: North Watershed
Element Name: Salt Creek SubbaS'in
Graph Type: standard
Lag Time {MN) s3.8


HEC-HMS
Reach
Routing
Options
Basin Name: Horth Watershed
Element Name: Salt Creek Reach
Description:
Downstream: Otay River Junction
Routing Method: Muskingum-Cunge
Loss/Gain Method: -one--
HEC-HMS
Reach
Routing
Basin Name: North Watershed
Element Name: Salt Creek Reach
Trme Step Method: Automatic Fixed hterval
"length (FT) 31590
"Slope (FT/FT) 0.043
Manning's n: ;0.
hvert (FT)
Shape: Trapezoid
"Bottom Width {FT) 10
ide Slope (xi-I:IV) 3

Otay Ranch University Villages-Otay River Analysis
Salt Creek Subbasin & Reach

Proposed Conditions

DRAINAGE AREA	3338.0 acres	5.216 mi

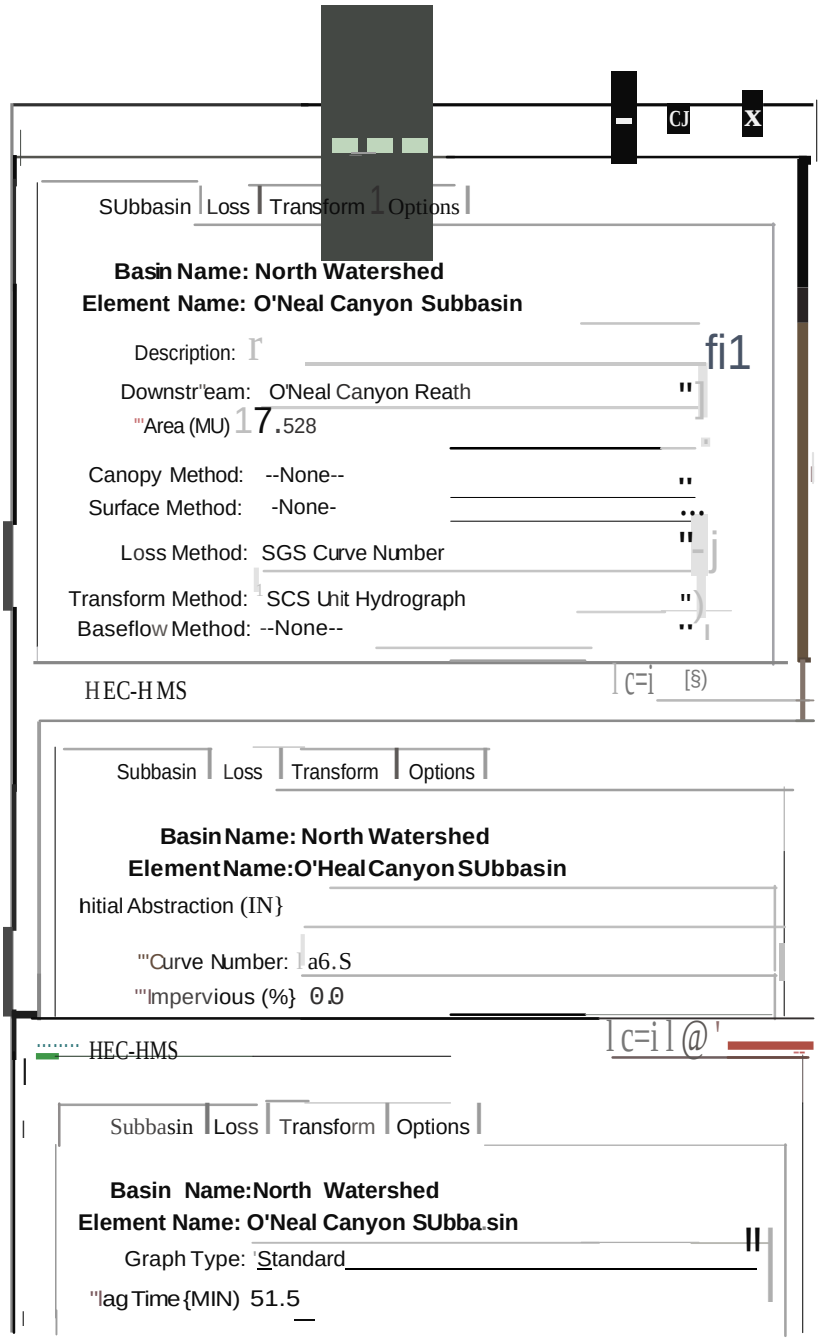
Curve Number			
98	0	acres	(Major Arterials)
92	0	acres	(Commercial Development)
91	0	acres	(Mixed Use .Schools. Hospital)
90	0	acres	(High Density Residential Development)
87	2556	acres	(Single-Family Residential Development)
81	782	acres	(Open Space)

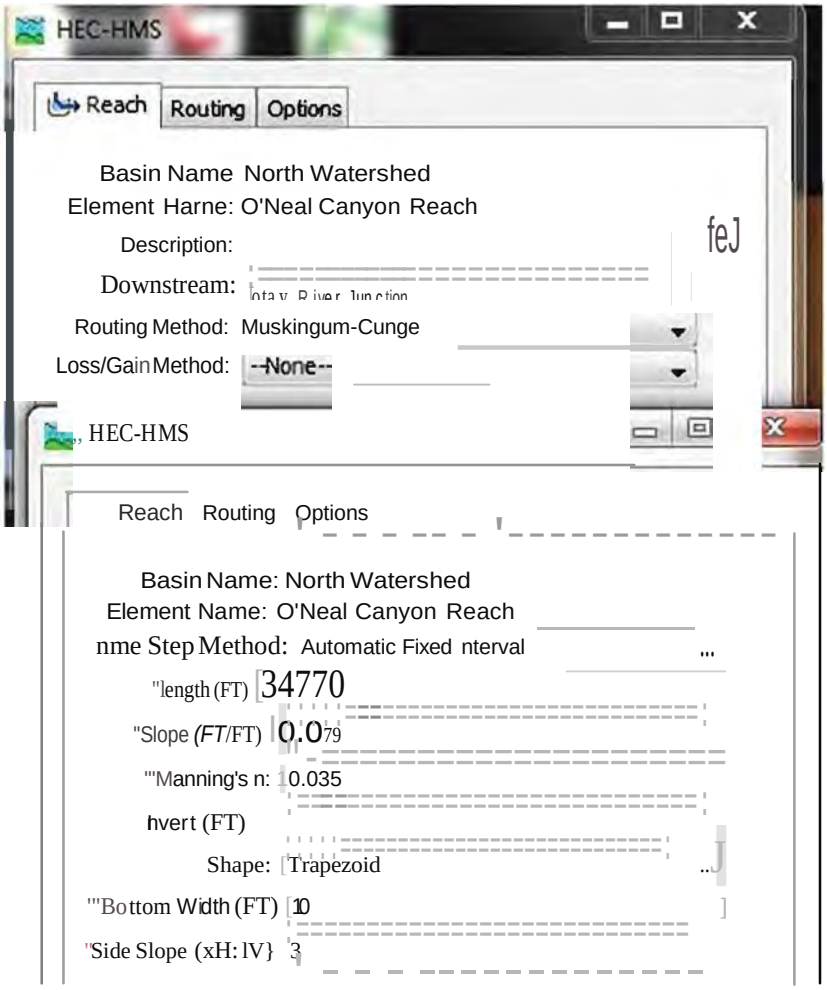
CURVE NUMBER =	85.6	AMC=2.0
Adjusted CN=	**89.8**	AMC=2.5

Average n	0.035	
m	0.38	
L	5.98	miles
Le	2.99	miles
U/S Elev.	1600	feet
D/S Elev.	240	feet
S	227	ft/mile

LAG TIME =	**0.896**	**hours**
	53.8	**min**

SOIL GROUP D ASSUMED


SUbbasin Loss Transform Options
Basin Name: North Watershed
Element Name: O'Neal Canyon Subbasin
Description:
Downstr''eam: O'Neal Canyon Reath
'''Area (MU) 17.528
Canopy Method: --None--
Surface Method: -None-
Loss Method: SGS Curve Number
Transform Method: SCS Unit Hydrograph
Baseflow Method: --None--
HEC-HMS
Subbasin Loss Transform Options
Basin Name: North Watershed
Element Name: O'Heal Canyon SUbbasin
hitial Abstraction (IN}
'''Curve Number: a6.S
'''Impervious (%} 0.0
HEC-HMS
Subbasin Loss Transform Options
Basin Name: North Watershed
Element Name: O'Neal Canyon SUbbasin
Graph Type: Standard
''lag Time {MIN) 51.5


HEC-HMS
Reach
Routing
Options
Basin Name North Watershed
Element Harne: O'Neal Canyon Reach
Description:
Downstream:
Routing Method: Muskingum-Cunge
Loss/Gain Method: --None--
HEC-HMS
Reach Routing Options
Basin Name: North Watershed
Element Name: O'Neal Canyon Reach
nme Step Method: Automatic Fixed nterval
"length (FT) 34770
"Slope (FT/FT) 0.079
'"Manning's n: 0.035
hvert (FT)
Shape: Trapezoid
'"Bottom Width (FT) 10
'Side Slope (xH: lV} 3

Otay Ranch University Villages-Otay River Analysis
O'Neal Canyon Subbasin & Reach

Proposed Conditions

DRAINAGE AREA	4822.0 acres	7.534	mi^2

CN = 98	0	acres	(Major Arterials)
CN = 92	0	acres	(Commercial Development)
CN = 91	0	acres	(Mixed Use - Schools, Hosprtal)
CN = 90	0	acres	(High Density Residential Development)
CN = 87	0	acres	(Single-Family Residential Development)
CN = 81	4822	acres	(Open Space)

CURVE NUMBER = 81.01 AMC=2.0

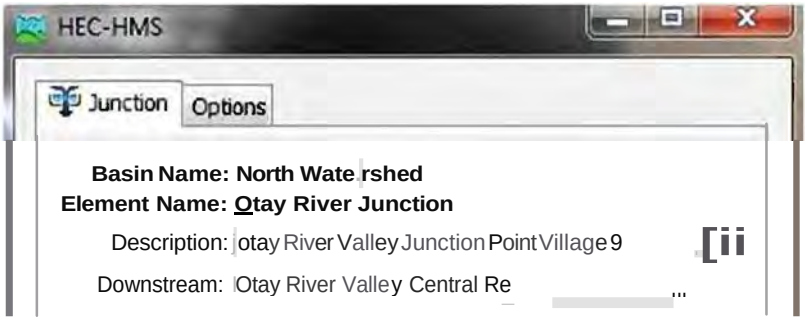
86.5 AMC=2.5

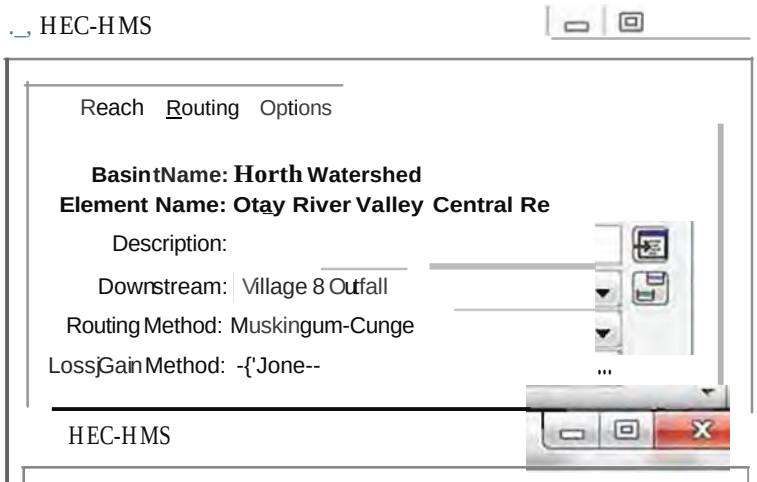
Average n	0.035	
m	0.38	
L	6.58	miles
Le	3.29	miles
U/S Elev.	3000	feet
D/S Elev.	240	feet
S	419	ft/mile

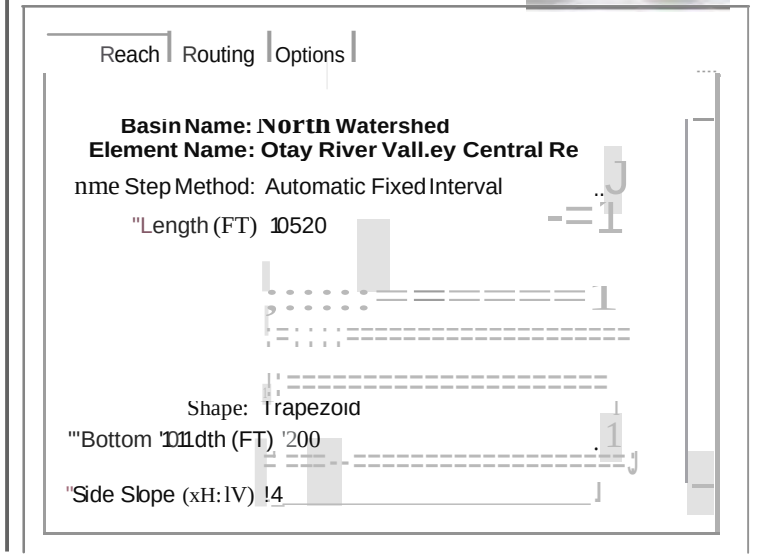
ILAG TIME = 0.858 hours

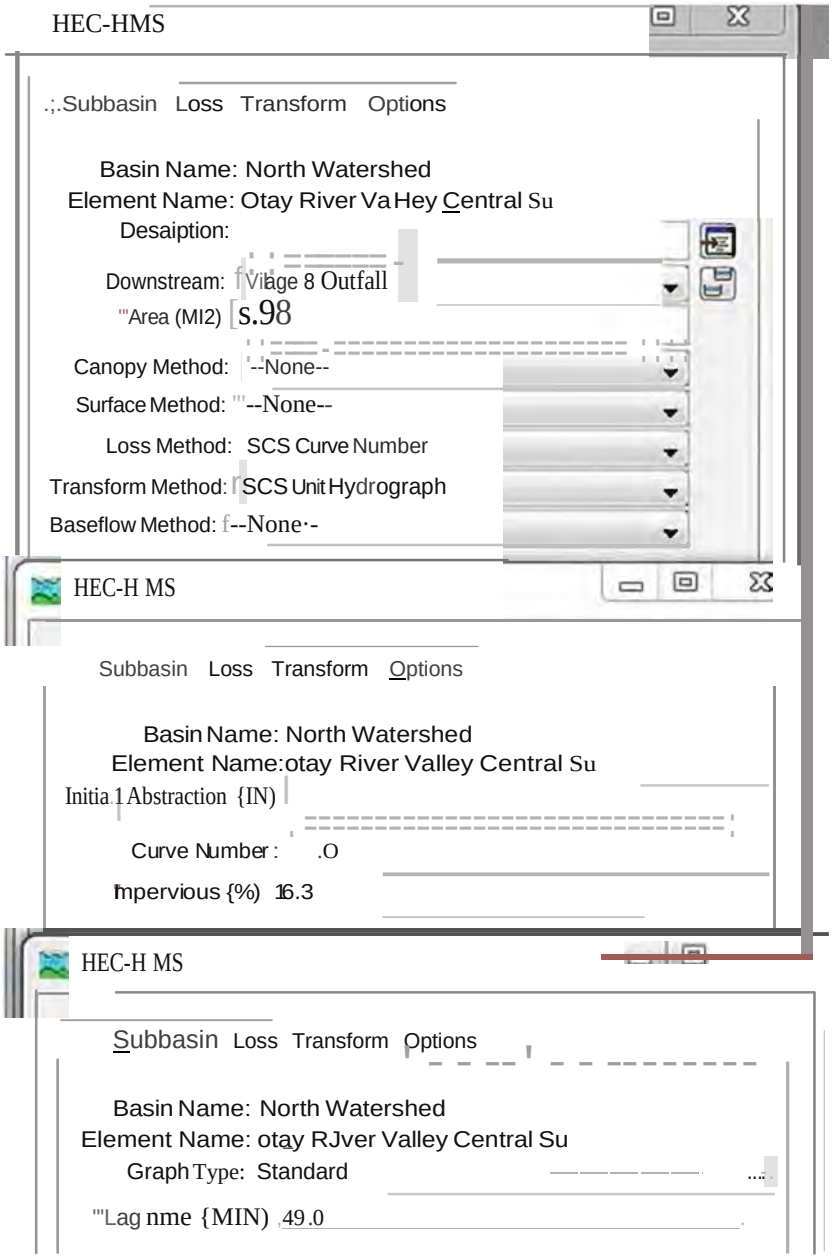
51.5 min

SOIL GROUP 0 ASSUMED


HEC-HMS
Junction
Options
Basin Name: North Wate rshed
Element Name: Otay River Junction
Description: otay River Valley Junction Point Village 9
Downstream: Otay River Valley Central Re


HEC-HMS
Reach Routing Options
Basin tName: Horth Watershed
Element Name: Otay River Valley Central Re
Description:
Downstream: Village 8 Outfall
Routing Method: Muskingum-Cunge
Loss/Gain Method: -{'Jone--


HEC-HMS
Reach Routing Options
Basin Name: North Watershed
Element Name: Otay River Vall.ey Central Re
nme Step Method: Automatic Fixed Interval
"Length (FT) 10520
Shape: Trapezoid
"'Bottom '101dth (FT) '200
"Side Slope (xH:1V) !4


HEC-HMS
.;.Subbasin Loss Transform Options
Basin Name: North Watershed
Element Name: Otay River Va Hey Central Su
Desaiption:
Downstream: Vilage 8 Outfall
Area (MI2) s.98
Canopy Method: --None--
Surface Method: --None--
Loss Method: SCS Curve Number
Transform Method: SCS Unit Hydrograph
Baseflow Method: --None--
HEC-H MS
Subbasin Loss Transform Options
Basin Name: North Watershed
Element Name:otay River Valley Central Su
Initia.1 Abstraction {IN}
Curve Number: .O
Impervious {%) 16.3
HEC-H MS
Subbasin Loss Transform Options
Basin Name: North Watershed
Element Name: otay RJver Valley Central Su
Graph Type: Standard
Lag nme {MIN) 49.0

Otay Ranch University Villages-Otay River Analysis
Otay River Valley Central Subbasin

Proposed Conditions

DRAINAGE AREA	3827.0 acres	5.980 mi^2

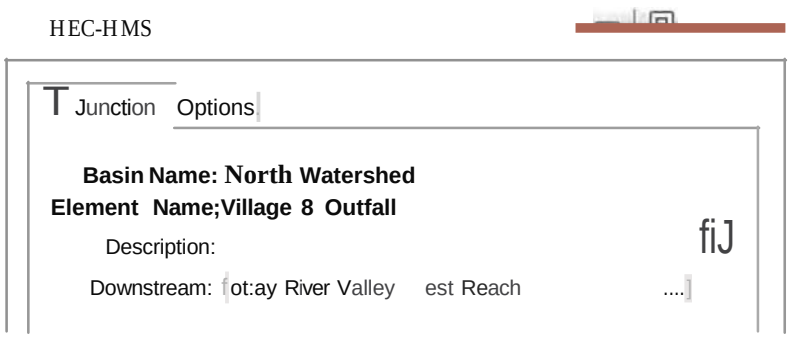
98	0	acres	(Major Arterials)
92	0	acres	(Commercial Development)
91	0	acres	(Mixed Use - Schools, Hospital)
90	0	acres	(High Density Residential Development)
87	1249	acres	(Single--Family Residential Development)
81	2578	acres	(Open Space)

CURVE NUMBER = 88. 0 AMC=2.5
83.01AMC=2.0

Average n	0.035	
m	0.38	
L	4.81	miles
Le	2.405	miles
U/S Elev.	940	feet
D/S Elev.	190	feet
S	156	fl/mile

ILAG TIME = 0.816 hours
49.0 min

SOIL GROUP D ASSUMED



5Global Summary Results for Run ftlOOyr 6hrft

Project: 0915-HMS-PR Simulation Run: lOOyr 6hr

Start of Run: 01Jan2011, 00:00 Basin Model: North Watershed
End of Run: 08Jan2011, 00:00 Meteorologic Model: 100 Year 6 Hour
Compute Time: 11Mar2011, 12:53:44 Control Specifications: 100 Year

Show Elements: Initial Selection ... Volume Units: IN AC-FT Sorting: Hydrologic ...

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Village S Outfall	115.634	6580.4	01Jan2011, 09:10	1.13

[ii Global Summary Results- for Run ftlOOyr 24ht"

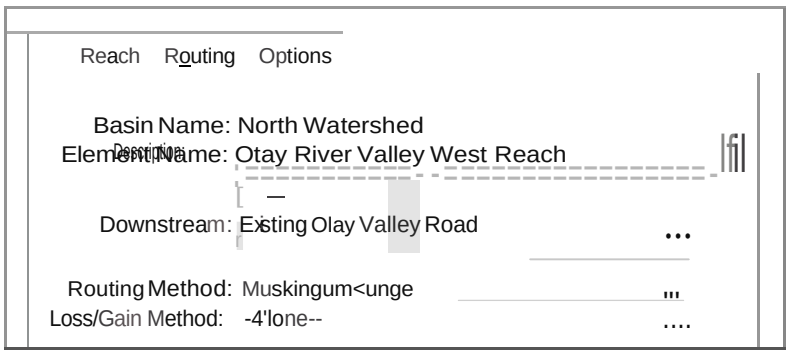
Project: 0915-HMS.PR Simulation Run: lOOyr 2'4hr

Start of Run: 01Jan2011, 00:00 Basin Model: North Watershed
End of Run: 08Jan2011, 00:00 Meteorologic Model: 100 Year 24 Hour
Compute Time: 11Mar2011, 12:54:47 Control Specifications: 100 Year

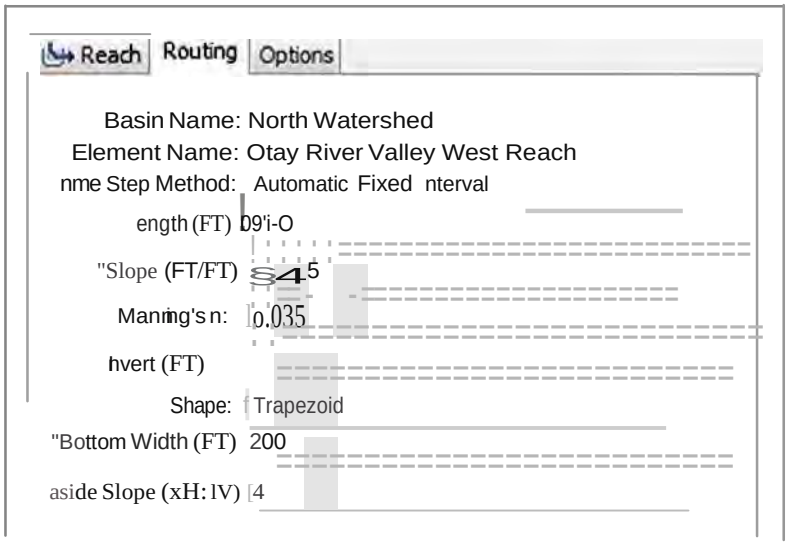
Show Elements: Initial Selection ... Volume Units: IN AC ..fT Sorting: Hydrologic ,..

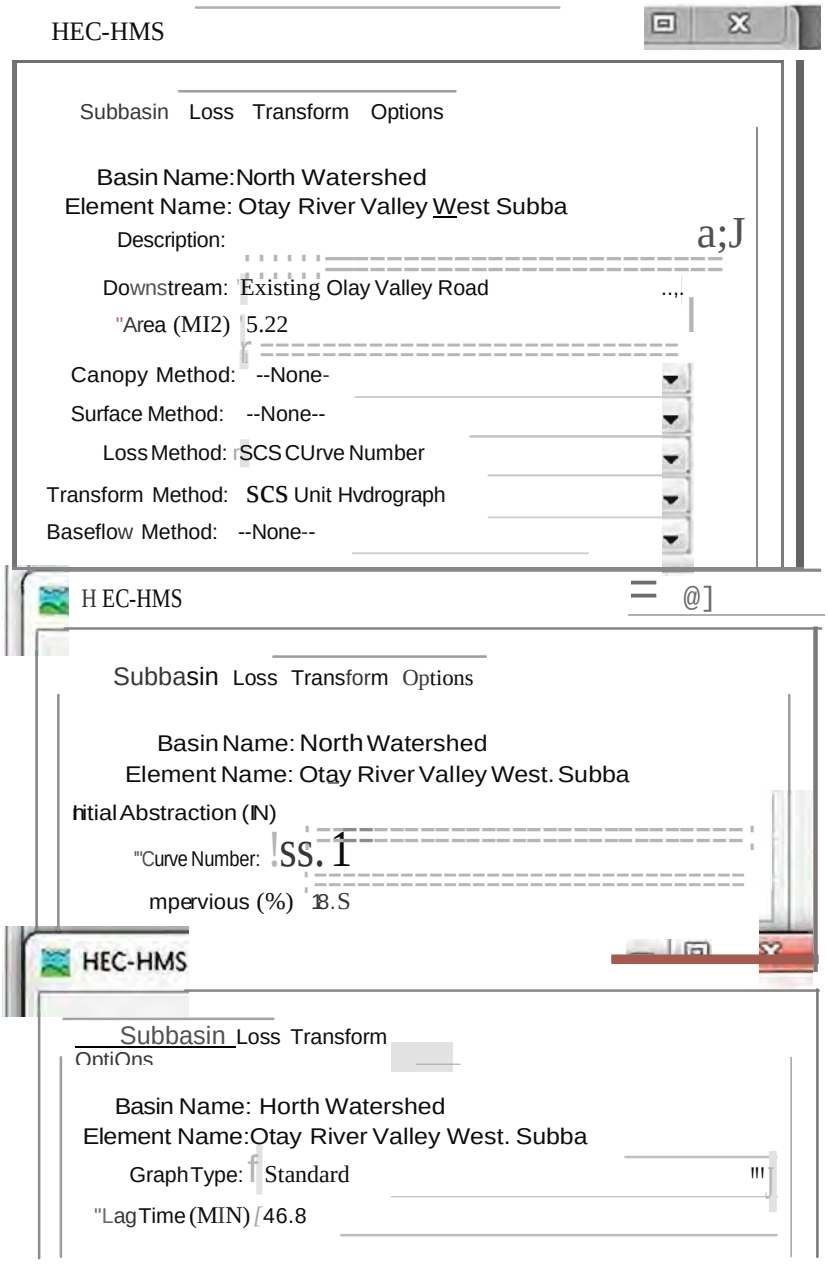
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Tme of Peak	Volume (IN)
Village 8 Outfall	115.634	1941 0.6	01Jan2011, 20:55	3.69

HEC-HMS



HEC-HMS




HEC-HMS
Subbasin Loss Transform Options
Basin Name: North Watershed
Element Name: Otay River Valley West Subba
Description:
Downstream: Existing Olay Valley Road
Area (MI2) 5.22
Canopy Method: --None-
Surface Method: --None--
Loss Method: SCS CUrve Number
Transform Method: SCS Unit Hydrograph
Baseflow Method: --None--
H EC-HMS
Subbasin Loss Transform Options
Basin Name: North Watershed
Element Name: Otay River Valley West. Subba
Initial Abstraction (IN)
Curve Number: 55.1
Impervious (%) 18.5
HEC-HMS
Subbasin Loss Transform
OptiOns
Basin Name: Horth Watershed
Element Name: Otay River Valley West. Subba
Graph Type: Standard
Lag Time (MIN) 46.8

Otay Ranch University Villages-Otay River Analysis
Otay River Valley West Subbasin

Proposed Conditions

DRAINAGE AREA	**3343.0 acres**	**5.223 mi**

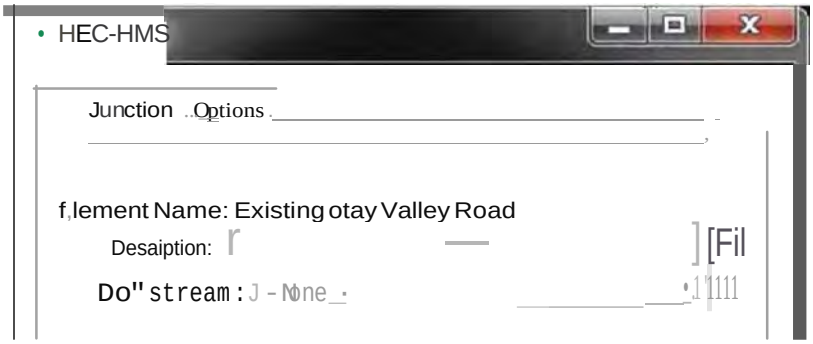
98	0	acres	(Major Arterials)
92	0	acres	(Commercial Development)
91	0	acres	(Mixed Use ·Schools. Hospital)
90	0	acres	(High Density Residential Development)
87	1237	acres	(Single-Family Residential Development)
81	2106	acres	(Open Space)

CURVE NUMBER = 83.21AMC=2.0
88.1 AMC=2.5

Average n	0.035	
m	0.38	
L	4.16	miles
Le	2.08	miles
U/S Elev.	600	feet
D/S Elev.	140	feet
S	111	ft/mile

LAG TIME =	**0.780**	**hours**
	46.8	**min**

SOIL GROUP D ASSUMED


• HEC-HMS
Junction Options
f,lement Name: Existing otay Valley Road
Desaiption:
Do" stream : J - None

£ii Global Summary Results for Run "lOOyr 6hr"

Project: 091S+iMS-PR Simulation Run: lOOyr 6hr

Start of Run: 0Uan2011,00:00
End of Run: 08Jan2011,00:00
Compute Time: 1IMar2011, 12:53;44

Basin Model: North Watershed
Meteorologic Model: 100 Year 6 Hour
Control Specifications: 100 Year

Show Elements: Initial Selection ... Volume Unlts; IN AC-FT Sorting: Hydrologic ....

Hydrologic Bement	Drainage Area (M2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Existing Otay vaaey •• .	120.854	7812.6	01Jan20 11,05:45	1.14

GS Global Summary Results for Run "lOOyr 24hr"

Project; 09S+tMS-PR Simulation Run: lOOyr 24hr

Start of Run: O Uan2011,00:00
End of Run: 08Jan2011,00:00
Compute Ttme; 11Mar2011, 12:54:47

Basin Model: North Watershed
Meteorologic Model: 100 Year 24 Hour
Control Specitkabons 100 Year

Show Elements: Initial Selection .... Volume Units: IN AC-FT Sorting: [Hvdrologic ....

Hydrologic Element	Drainage Alea (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
EXlsting Otay Valley ...	120.854	20161.4	O 1Jan20 11, 21:05	3.70

Appendix M

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
25220 Hancock Avenue, Suite 420
Murrieta, California 92562
Telephone: (619) 708-1649 Fax: (714) 409-3287

OTAY LAND COMPANY
1903 Wright Place, Suite 220
Carlsbad, CA 92008-1420

March 11, 2011
P/W 1009-05
Report No. 1009-05-B-4

Attention: Mr. Jeff O'Connor

Subject: Geotechnical Opinion Letter, Hydro-Modification and Scour in Wolf Canyon Drainage, Otay Ranch, Village 8 West, Chula Vista, California

1. *Geology of the Otay Mesa Quadrangle, Kennedy, M P., and Peterson, G.L., 197j, Geology of the eastern San Diego metropolitan area, California: California Division of Mines and Geology Bulletin 200*
2. *Preliminary Tentative Map, Otay Ranch, Village 8 West, Chula Vista, California, Sheet 3 of ,7prepared by Hale Engineering (last revision dated August 11, 2010)*
3. *Revised Geotechnical Investigation, Village 8 West, Otay Ranch, Chula Vista, California, prepared by Advanced Geotechnical Solutions, Inc., dated October 22, 2010 (Report No. 1009-05-B-2)*

Mr. O'Connor:

Pursuant to your request Advanced Geotechnical Solutions, Inc. (AGS) has prepared this geotechnical opinion letter regarding the hydro-modification of the drainage at the southwest comer of Planning Area A, Otay Ranch, Village 8 West, Chula Vista, California. Specifically, the proposed hydro-modification basin will be constructed in Planning Area F with the proposed storm drain outfall westerly subjacent to Planning Areas A and E. In preparing this opinion letter representatives of AGS conducted the following:

- Reviewed the referenced Preliminary Tentative Map prepared by Hale Engineering.
- On February 22, 2011 observed and mapped the surface geology of the existing drainage in the approximate area described above.
- Reviewed the published and proprietary geologic maps for the area (references).

Based upon this information AGS has developed the following observations and conclusions:

Geomorphology

Based upon our recent observations of the existing channel and review of the referenced geologic maps, the geology along the eastern portion of the drainage consists of minor amounts of modern alluvial soils (I to 5 feet) overlying a Mezozoic-aged Santiago Peak Volcanics. Within the existing channel the geology consists of Otay formation along the east side and Santiago Peak Volcanics along the west side. With a thin veneer of modern alluvium at in the broader flatter portions of Wolf Creek near the top of the existing channel. Approximately 1,500 feet southwest of the proposed stonn drain outfall, the exposed geology transitions to Tertiary-aged Otay Formation which non-conformably overlies the Santiago Peak

Volcanics. Thicker sections of modern alluvial soils are anticipated to exist within this western portion of the drainage.

The alluvium consists of a dark brown to brown, moist, loose to medium dense, silty to clayey sand with gravel and is considered moderately erosive. Some cobble sized clasts were noted at the contact of the underlying Santiago Peak Volcanics. The Santiago Peak Volcanics are generally dense and mildly metamorphosed volcanic and volcaniclastic rocks. Composition of the volcanic rocks varies from basalt to rhyolite but is predominantly dacite and andesite. The erosive character of the Santiago Peak Volcanics is considered to be very low. The Otay Formation is predominantly composed of poorly to moderately indurated siltstone, sandstone, 'gritstone', and gravel to cobble rich Breccia subunits and is considered to be very low to low erosive.

Channel Observations

Based upon our observations, natural scour and down cutting of the channel has occurred from the easterly end of the proposed outfall structure to approximately 1,500 lineal feet downstream. In this upper portion of the Wolf Creek channel down cutting has exposed Otay formation along the east side and Santiago Peak Volcanics along the west side of the channel. Numerous boulders and cobbles are present in the channel bottom and there is a significant population of small trees and scrub brush. Additional down cutting is unlikely in this area due to the hard nature of the bedrock exposed in the channel bottom and the existing growth situated in the channel indicative of a "mature" drainage. Below this area of Wolf Creek the scouring and down cutting ends and a depositional regime begins as indicated by the transition from a predominantly straight channel to a meandering channel with more and larger mature trees and heavy foliage. Deposition in this area is likely related to the flatter channel gradients and subsequent lower flow velocities.

Conclusions and Opinions

In conclusion, scouring and down cutting has occurred in the eastern portion of the channel, extending approximately l ,500 feet southwest from the proposed outfall structure. The scouring and down cutting is a result of the natural higher velocities in this reach due to a steeper gradient. This natural down cutting of the weaker more erosive alluvial soils present in the channel have exposed the much less erosive bedrock units (Otay Fonnation and Santiago Peak Volcanic Rock). No other portions of the channel appear to be experiencing active erosion. Based upon the designed hydro-modifications a reduction of peak storm flows of approximately 40% to 50% are expected in this reach of the Wolf Creek channel once Village 8 West is developed. Accordingly, appreciable scouring and down cutting is not anticipated to occur in this reach of the Wolf Creek due to the erosion resistant nature of the bedrock exposed in the channel and the reduction of peak flows in the channel. It is AGS's opinion that the proposed hydro-modifications constructed in conjunction with Village 8 West wil lnot create additional scour or result in any significant modification to the existing Wolf Creek channel.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact the undersigned.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.

JEFFREY A. CHANEY, Vice President
RCE 46544/GE 2314 Exp.6/30/11

Distribution: Addressee (4)
Hale Engineering Attn: Mr. John Hayes (I)



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OTAY LAND COMPANY
1903 Wright Place, Suite 220
Carlsbad, CA 92008-1420

July 7, 2011
P/W 1009-05
Report No. I009-005-B-4

Attention: Mr. Jeff O'Connor

Subject: Geotechnical Opinion Letter Regarding Scour and Stability Storm Drain Outfall from Village 8 West into Otay River, Chula Vista, California

References: *Geology of the Otay Mesa Quadrangle, Kennedy, M P., and Peterson, G.L.. 19*75, *Geology (Jf the eastern San Diego metropolitan area, California: California Division of Mines and Geology Bulletin 200*

Preliminary Tentative Map, Otay Ranch, Village 8 West, Chula Vista, California, Sheet 3 of .7prepared by Hale Engineering (last revision dated August 11, 2010)

Revised Geotechnical Investigation, Village 8 West, Otay Ranch, Chula Vista, California, prepared by Advanced Geotechnical Solutions, Inc., dated October 22, 2010 (Report No. 1009-05-B-2)

Gentlemen:

Pursuant *to* your request Advanced Geotecbnical Solutions, Inc. (AGS) has prepared this geotechnical opinion letter regarding the proposed storm drain outfall from Village 8 West, into the Otay River, Chu la Vista, California. Specifically, AGS has reviewed the proposed design, hydrology, stream profile, and the HEC-RAS infonnation provided by Hale Engineering for the proposed outfall with regard to the Revised Geotechn ical Investigation (AGS report dated October 22, 2010). Based upon our conversations and review of infonnation provided to us by Hale Engineering AGS has prepared the following opinions:

Structural Design of OutfaU

It is our understand ing that the proposed outfall structure will consist of a USBR Type rv Energy Dissi pater-Impact Basin at the end of the proposed energy dissipater additional erosion control at the outfall will be provided by a section of one ton riprap. As currently designed the proposed energy dissipater will be located above water surface with the 1 ton riprap outfall below the calcu lated 100 year flood surface. The foundation for the dissi pater will be embedded approximately five (5) to six (6) feet into the existing ground. Based upon the soi l characteristics, the anticipated velocities of the 100-year flood, the location and design of the outfal l, the embed ment of the d issipater, and the size of the riprap it is AGS's opinion that the tractive forces of the Otay River will not adversely affect the integrity of the proposed outfall structure or the associated rip-rap.

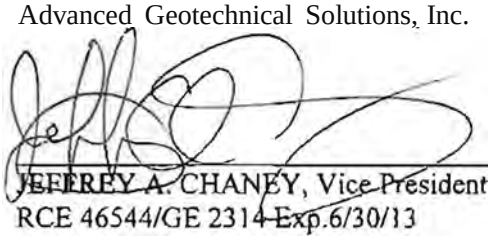
Erosion Potential of Outfall

Based upon the profiles and calculations provided to us from Hale Engineering the outJet (baffle wall and associated one ton rip rap) will red uce the velocity of the water emanating from the

outfall to less than 6 to 7 feet/second. This design velocity will be above the calculated velocity of the Otay River during the 100 year flood event (4 feet/second). Based upon the proposed orientation of the outfall with regard to the existing topography, the proposed riprap and the velocity of the discharge it is AGS's opinion that the proposed post development outfall will not create additional erosion in the Otay River.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact the undersigned.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.



JEFFREY A. CHANEY, Vice President
RCE 46544/GE 2314 Exp.6/30/13



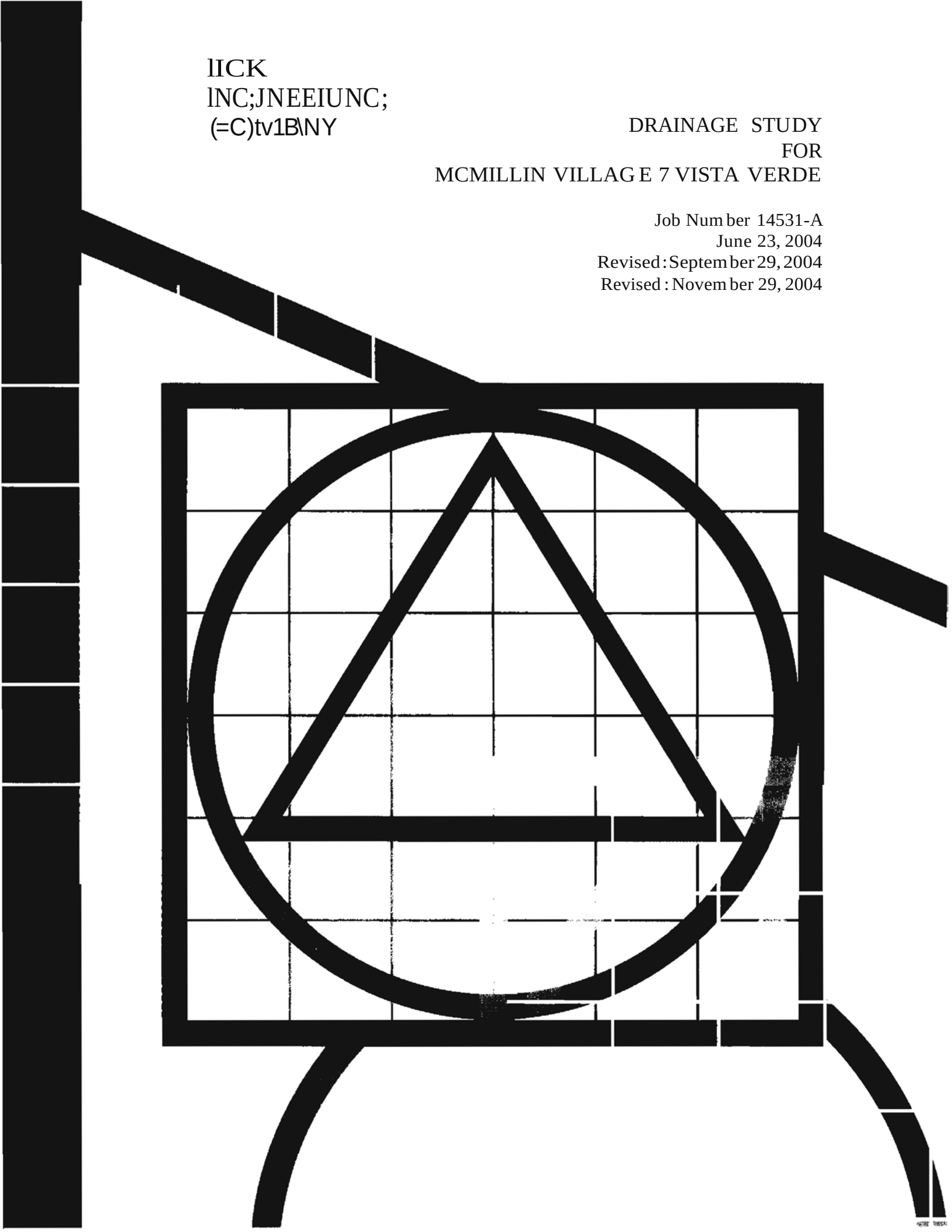
Distribution: Addressee (4)
Hale Enginring. Atm: Mr. John Hayes (I)

Appendix N

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DRAINAGE STUDY
FOR
MCMILLIN VILLAG E 7 VISTA VERDE

Job Num ber 14531-A
June 23, 2004
Revised : Septem ber 29, 2004
Revised : Novem ber 29, 2004



DRAINAGE STUDY REPORT FOR MCMILLIN VILLAGE 7 VISTA VERDE REVISION PAGE

November 29, 2004

This drainage study report provides revisions to the drainage study dated September 29, 2004 to incorporate City of Chula Vista third plan check comments for the McMillin Village 7 Vista Verde project.

Rick Engineering Company has reviewed the City of Chula Vista plan check comments. In addition, representatives from Rick Engineering Company have made a call to the City of Chula Vista in regards to the following plan check comments. The following is an outline of the City of Chula Vista comments (in italicized lettering) and Rick Engineering Company response (in bold lettering).

1. *Comment on cover page regarding Dry Lane Requirements.*

   Dry lane requirements for the interior and exterior streets have been met by maintaining the 50-year flow rate below top of curb as stated in the Chula Vista *Subdivision Manual.*

2. *Comment on cover page regarding the display of Velocity (V), Time of Concentration (Tc), Area (A), and Discharge (Q) on all workmaps for all inlets and outlets.*

   On November 18, 2004 Rick Engineering Company representatives had a phone conversation with Chester Bautista with the City of Chula Vista and an agreement of showing the A, Tc, Q, and, V for all major inlets and outlets is acceptable.

3. *On page 14. 16, and 20 a comment was made regarding the sizing of the three detention basins in series using the 2-, 10-, and 100-year storm events. The City of Chula Vista would like the three detention basins to be sized for the 10-, 50-, and 100-year storm events.*

   The *Conditions of Approval* for the McMillin Village 7 Vista Verde Tentative Subdivision project will attenuate the 2-, 10-, and 100-year peak project flows to pre project levels. Please refer to the attached reference from the Conditions of Approval following this revision page.

4. *Comment on page 15 stating that the use of the Intensity Method should be used to size the three detention basins.*

   The three detention basins were sized based on the City of Chula Vista Subdivision Manual. The 2-, 10-, and 100-year post project flows were detained to pre-project levels, please refer to Appendix H.

5. *Comment on page 18 regarding the size of the outlet structures located in the three detention basins. The comment stated that the outlet structures are to big and that 7-feet of maximum depth and 2-feet offreeboard was agreed upon.*

   On November 18, 2004 Rick Engineering Company had a phone conversa tion with Chester Bautista from the City of Chula Vista discussing the comment above. An agreement that the requirements above pertain to the desilting basins for the project not the water quality and extended detention basins. All of the desilting basins for the McMillin Village 7 Vista Verde project ne below 7-feet in depth and contain 2-feet of freeboard.

6. *Comment on the cover page regarding riser calculations for the 100-year storm event.*

   Rating Curves for each of the outlet structures are included i n this submittal, please refer to Appendix H.

7. *Comment on the cover page regarding detention basin calculations.*

   Detention basin calculations were included in the September 29, 2004. Please refer to the A ppendix H in back of the report.

8. *Comment on page 3 regarding the use of the 1998 City of Chula Vista Subdivision Manual.*

   Rick Engineering Company has made the change to the spelling error and replaced the 1998 with 2002.

9. *Comment on page 4 regarding the addition of text to the hydrologic conditions rainfall intensity criteria.*

   The addition of text to the above has been made to incorporate the "Chula Vista Design Standards".

Exhibit "B"

Village of Vista Verde Tentative Subdivision Map
(C.V.T.0507)

CONDITIONS OF APPROVAL

Unless otherwise specified or required by law: (a) the conditions and Code requirements set forth below shall be completed prior to the related final map as determined by the Director of Planning and Building, the City Engineer, and the Director of General Services, (b) unless otherwise specified, "dedicate" means grant the appropriate easement, rather than fee title. Where an easement is required the Applicant shall be required to provide subordination of any prior lien and easement holders in order to ensure that the City has a first priority interest and rights in such land unless otherwise excused by the City. Where fee title is granted or dedicated to the City, said fee title shall be free and clear of all encumbrances, unless otherwise excused by the City.

Should conflicting wording or standards occur between these conditions of approval, any conflict shall be resolved by the City Manager or designee.

GENERAL/PRELIMINARY

1. All of the terms, covenants and conditions contained herein shall be binding upon and inure to the benefit of the heirs, successors, assigns and representatives of the Developer as to any or all of the Property. For purposes of this document the term "Developer" shall also mean "Applicant". *(Planning)*

2. The Applicant shall comply with all requirements and guidelines of the City of Chula Vista General Plan the City's Growth Management Ordinance; Chula Vista Landscape Manual; Chula Vista Design Manual; Otay Ranch General Development Plan, Otay Ranch Resource Management Plan, Phase 1 and Phase 2; Ranch Wide Affordable Housing Plan; Otay Ranch Overall Design Plan; Village Seven Sectional Planning Area (SPA) and Tentative Maps (TMs), Final Second Tier Environmental Impact Report (Final EIR 04-06) and associated Mitigation Monitoring and Reporting Program (MMRP) Otay Ranch Village Seven Sectional Planning Area (SPA) Plan and supporting documents including: Public Facilities Finance Plan (PFFP); Parks, Recreation, Open Space and Trails Plan; SPA Affordable Housing Plan, Air Quality Improvement Plan (AQIP), Water Conservation Plan (WCP); and the Non-Renewable Energy Conservation Plan as amended from time to time, unless specifically modified by the appropriate department head, with the approval of the City Manager. These plans may be subject to minor modifications by the appropriate department head, with the approval of the City Manager, however, any material modifications shall be subject to approval by the City Council. *(Planning)*

3. If any of the terms, covenants or conditions contained herein shall fail to occur or if they are, by their tenns, to be implemented and maintained over time, if any of such conditions fail to be so

GRADING AND DRAINAGE

60. The Applicant shall provide drainage improvements in accordance with the Otay Ranch Village Seven Village of Vista Verde J>reliminary Drainage Study, dated May 24, 2004, or a subsequent Hydrology Study submitted to and approved by the City Engineer. The Applicant shall maintain all such drainage improvements until said improvements are formally accepted bythe City or an applicable maintenance district, or other mechanism as approved by the City. Said maintenance shall ensure that drainage facilities will continue to operate as designed. *(Engineering)*

61. Prior to approval of any grading permit or any other grant of approval for constructing the proposed extended detention and water quality treatment basins, whichever occurs earlier, the Applicant shall demonstrate that the design of the proposed extended detention and water quality treatment basins would reduce the 2-, 10-, and 100-year post-development peak flows, to any natural drainage course to an amount not exceeding pre-development cond1tions, to the satisfaction of the City Engineer *(Engineering)*

62. Storm drain systems that collectwater from private property shall be designated private on grading and drainage and/or improyement plans to the point of connection with a public system or to the point at which storm waterthat is collected from public street right-of-way, public park or open space areas is first introduced into the system. Downstream from that point, the storm drain system shall be public. An encroachment permit shall be processed and approved by the City for private storm drains within the public right-of-way or within C.F.D. maintained Open Space lots. *(Engineering)*

63. Submit with grading and drainage and/or improvement plans, as applicable, hydrologic and hydraulic studies and calculations, including dry lane calculations for all public streets. Calculations sruill also be provided to demonstrate the adequacy of downstream drainage structures, pipes and inlets. *(Engineering)*

64. Prior to the issuance of any grading permit which impacts off-site property, the Applicant shall deliver to the City, a notarized letter of permission to grade and drain for all off-site grading. *(Engineering)*

65. Storm drain design shall conform to the requirements of the Subdivision Manual and the Grading Ordinance as may be amended from time to time. *(Engineering)*

66. Provide improved all-weather access with H-20 loading, based on a minimum traffic index (TI) of 5, to all public stonn drain clean-outs or as otherwise approved by the City Engineer . *(Engineering)*

67. All City maintenance access roads shall be 12' min. width and designed for H-20 (min.TI of 5) loading. Provide a minimum of 6-inch thick PCC (reinforced with #4 BAR at 18" on center

DRAINAGE STUDY

FOR

MCMILLIN VILLAGE 7 VISTA VERDE

Job Number 14531-A

Dennis C. Bowling, M.S.
R.C.E. #32838
Exp. 06/06

Prepared For:

McMillin Companies
2727 Hoover Avenue
National City, California 91950
(619) 477-4117

Prepared By:

Rick Engineering Company
Water Resources Department
5620 Friars Road
San Diego, California 92110-2596
(619) 291-0707

June 23, 2004
Revised: September 29, 2004
Revised: November 29, 2004

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Appendices:

Appendix A – 2-, 10-, and 100-Year Rational Method Results for the Pre-Project Condition

Appendix B – 50-Year Rational Method Results for the Post-Project Condition for Systems 1000, 2000, 3000, 11000, 12000, 13000, and 14000

Appendix C – 100-Year Rational Method Results for the Post-Project Condition for System 3000 (Magdalena Avenue)

Appendix D - Back Up Information for Rational Method Analyses

Appendix E - 50-Year Pipeflow Results for Systems 1000, 2000, 3000, 11000, 12000, 13000, and 14000

Appendix F - 100-Year Pipeflow Results for Systems 3000a, 3000b, 3000c (Magdalena Avenue)

Appendix G – Inlet and Brow Ditch Sizing Calculations

Appendix H – Water Quality and Detention Basin Results

Appendix I – Desilting Basin and Buoyancy Calculations for Basin 4000, 5000, 6000, 7000, 8000, 9000, and l 0000 (Including the hydrologic analyses for the I 0- and 100-year storm events)

Appendix J - Riprap Calculations

Map Pockets:

Map Pocket 1 – Otay Ranch Village 7 Pre-Project Condition Hydrology Workmap

McMillin Otay Ranch Basin 1000 Drainage Map

McMillin Otay Ranch Basin 2000 Drainage Map

Map Pocket 2 – McMillin Otay Ranch Basin 3000 Drainage Map

McMillin Otay Ranch Basin 11000 Drainage Map

Map Pocket 3 - McMillin Otay Ranch Basin 12000 Drainage Map

McMillin Otay Ranch Basin 13000 Drainage Map

McMillin Otay Ranch Basin 14000 Drainage Map

OC13HJN'tel

VICINITY MAP

INTRODUCTION

The McMillin Village 7 Vista Verde project is located in the City of Chula Vista, north of Rock Mountain Road, south of Birch Parkway, west of the future State Route 125, and east of La Media Road (please see Vicinity Map on previous page). The project site as it exists today consists of rolling fannland with scattered vegetation. The northern portion of this project will ultimately drain into Poggi Canyon channel via existing storrndrain in La Media Road and Birch Road, while the central portion drains directly to Wolf Canyon and the southern portion flows offsite in a southwesterly direction where it eventually confluence's with Wolf Canyon. Offsite contributions from the Eastern Urban Center (EUC) was taken from the Rick Engineering Company study titled, "Drainage Study to Size Pipe Between E.U.C. and Village 7 Crossing SR-125 Right-of-Way", dated February 11, 2004.

This report is the third submittal and is in response to the report dated, September 29, 2004 plan check comments from the City of Chula Vista. This report contains hydrologic, hydraulic, temporary desilting basin, and detention basin calculations for the Vista Verde project. The analyses for this project is based upon the July 1, 2002 design manual titled, City of Chula Vista *Subdivision Manual*.

HYDROLOGIC METHODOLOGY AND CRITERIA

The Advanced Engineering Software (AES) Rational Method computer program based on the 2002 City of Chula Vista *Subdivision Manual* was used to determine 50-year storm event for the pre- and post-project peak flow rates. However, the I 00-year storm event was modeled for the post-project flow rates for the major crossing in Magdalena Avenue.

Rational Method Methodology and Criteria:

The hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results. The code numbers and their significance are as follows:

Subarea Hydrologic Processes (Codes)

Code	1:	Confluence analysis at a node
Code	2:	Initial subarea analysis
Code	3:	Pipe flow travel time (computer-estimated pipe sizes)
Code	4:	Pipe flow travel time (user-specified pipe size)
Code	5:	Trapezoidal channel travel time
Code	6:	Street flow analysis through a subarea
Code	7:	User-specified information at a node
Code	8:	Addition of the subarea runoff to mainline
Code	9:	V-Gutter flow through subarea
Code	10:	Copy mainstream data onto a memory bank
Code	11:	Confluence a memory bank with the mainstream memory
Code	12:	Clear a memory bank
Code	13:	Clear the mainstream memory
Code	14:	Copy a memory bank onto the mainstream memory
Code	15:	Hydrologic data bank storage functions

In order to perform the hydrologic analysis; base information for the study area is required. This information includes the land uses, drainage facility locations, flow patterns, drainage basin boundaries, and topographic elevations. This information was obtained from July 1, 2002 City

of Chula Vista *Subdivision Manual* and storm drain plans for the Vista Verde project. Please refer to Appendix A, B, and C and Map Pockets 1, 2, and 3 for the 2-, 10-, 50-, and I 00-year hydrologic analyses and the corresponding workmaps for the pre- and post-project conditions. The hydrologic conditions were analyzed using the following parameters:

Design Storm:	50-year* and 100-year* 6-hour
Runoff Coefficients:	Based on the Chula Vista Subdivision Design Manual**
Soil Type:	Varies**
Rainfall Intensity:	Based on the Chula Vista Subdivision Design Manual** and the Chula Vista Design Standards

*The detention basins were designed for the 2-, JO-, and JOO-year, 6-hour storm events. Please refer to the section titled *Detention Basin Design and Methodology* in this report.

**Please refer to Appendix D for excerpts from the July I, 2002 City of Chula Vista *Subdivision Manual*.

HYDROLOGIC RESULTS

Rational Method Results:

The rational method computer output for the 2-, 10-, and 100-year storm event for the pre-project condition is included in Appendix A, the 50-year storm event for the post-project conditions is included in Appendix B, and the 100-year storm event for the post-project condition for Magdalena Avenue is in Appendix C. The corresponding workmaps are located in Map Pockets 1, 2, and 3.

In the pre-project condition, the site consists of gently rolling hills with arroyos draining into larger canyons flowing southwest, away from the Otay Reservoir Basin. There are three major pre-project watersheds associated with the Vista Verde Project. The most northern drainage basin flows in a northwesterly direction through the Village 6 development and ultimately to Poggi Canyon. The central drainage basin, majority of the project site, flows in a westerly direction into Wolf Canyon. The third drainage basin located in the southern portion of the project site, flows offsite in a southwesterly direction. Refer to Appendix A for the rational method output for the 2-, 10-, and 100-year storm event for the pre-project condition.

The post-project condition for Vista Verde consists of single-family residential, park, and school development. The general drainage trends as described in the pre-project condition will remain similar to that of the post-project. The majority of the project will drain to Wolf Canyon where there will be a series of extended detention basins that have been designed to detain the 2-, 10-, and 100-year storm event to pre-project levels. In addition the extended detention basins will also treat the required volume of water for water quality per the City of Chula Vista's Standard Urban Stormwater Mitigation Plan (SUSMP). Refer to Appendix B for the rational method output for the 50-year storm event and Appendix C for the 100-year rational method output for the major crossing in Magdalena Avenue.

HYDRAULIC METHODOLOGY AND CRITERIA

The AES Pipeflow hydraulics computer program was used to determine the storm drain sizes, velocities, and hydraulic grade lines for the Vista Verde project for the 50-year, six-hour peak flows for the majority of the project. However, the 100-year, six hour peak flows were also calculated to size the storm drain system in Magdalena Avenue. In addition, inl et and brow ditch calculations were also performed for the 50-year storm event for inlets on grade and the I 00-year storm event for the inlets at a sump and all brow ditch's per the City of Chula Vista Standards. Refer to Appendix E for the detailed 50-year pipeflow analyses and Appendix G for the inlet and brow ditch calculations (the 100-year analysis is located in appendix F). Al so, riprap calculations have been performed for the storm drain outfalls (located in Appendix J).

The AES program performs gradually varied flow and pressure flow profile computa tions. The results are provided in an incremental and summarized form, and indicate reaches of open channel and pressure flow for a given reach of pipe. The program also accounts for losses that may occur due to friction, junction structures, pipe bends, etc. The codes and an explanation of their functions are as follows:

Pipeflow Hydraulic Processes (Codes)

Code 1: Friction Losses
Code 2: Manhole Losses
Code 3: Pipe-bend Losses
Code 4: Sudden Pipe-Enlargement
Code 5: Junction Losses
Code 6: Angle-Point Losses
Code 7: Sudden Pipe-Reduction
Code 8: Catch Basin Entrance Losses
Code 9: Transition Losses

The storm drain systems will be constructed of reinforced concrete pipe (RCP). The Manning's roughness coefficient "n" used for the hydraulic calculations is 0.013.

HYDRAULIC RESULTS

The AES Pipeflow hydraulics computer output for the McMillin Village 7 Vista Verde project is located in Appendix E and F. The resulting pipe sizes, discharge (Q), velocity (V), and hydraulic grade lines (HGL) for the development are shown on the storm drain plans for the project. The nodes identifying the different reaches of pipe for the Pipeflow analyses correspond to the hydrologic node numbers (please refer to Map Pockets 1, 2, and 3). The storm drain systems for the majority of the project has been designed to convey the 50-year, 6-hour peak storm event. However, due to the major crossing in Magdalena Avenue, the storm drain system in Magdalena Avenue has been sized to convey the 100-year, 6-hour peak storm.

A detailed brow ditch analysis has been performed for the 100-year storm event, and is included in Appendix G of this report. A detailed summary table of brow ditch sizes is located below and the corresponding node numbers for each brow ditch is also located below.

McMillin Village 7 Vista Verde

Brow Ditch Sununary Table

Brow Ditch	Type	100-Year Flow Rate (cfs)*	Slope (ft/ft)	Depth (ft)
Basin 1000				
1056	075-B	0.3	0.008	0.2
1065	075-B	3.2	0.010	0.5
1071a	075-B		0.032	0.3
1071b	075-B		0.060	0.3
8**	Modified 3.0-foot Wide 075-B	7.8	0.013	0.7
C**	Modi fied 2.5-foot Wide 075-B	4.8	0.013	0.6
Basin 2000				
2102a	075-B	3.0	0.008	0.6
2102b	075-8	3.0	0.008	0.6
A**	075-B	3.2	0.012	0.5
Basin 3				0.5
3019	075-B	0.7	0.008	0.5
3042	075-B	2.5	0.008	0.2
O**	075-B	4.6	0.154	0.3
E**	075-8	2.2	0.133	0.2

*Cubic feet per second
**Brow ditch located at the perimeter of the basin

lnlet calculations have been performed for the 50-year storm event. However, based on City of Chula Vista requirements for inlets in a sump, the sump inlets have been designed for the 100-year storm event. A detailed summary of Type B and F Inlets is located on the following page and is also included in Appendix G.

McMillin Village 7 Vista Verde
Inlet Summary Table

Node Number			ach Slope	Length of g (ft)	Length of Inlet (ft)
1002	Bl	6.1	0.0199	16	17
1006	Bl	4.7	Sum	4	5
1009	B2	12.9	Sum	8	9
1015	B	0.9	Sump	4	5
1017	B	5.2	Sump	4	5
1027	B	7.3	Sump	5	6
1030	B	11.1	Sum	7	8
1036	B	2.0	Sump	4	5
1039	B	7.1	Sum	5	6
1044	B	6.0	Sum	4	5
1047	B	5.2	Sum	4	5
1051	B	0.5	Sum	4	5
1053	B	1.8	Sump	4	5
1056	F	0.8	**	**	**
1062	B	3.4	Sum	4	5
1065	F	3.9	**	**	**
1068	B	3.0	Sump	4	5
1071	F	6.5	**	**	**
Basin 2000					
2005	Bl	2.3	0.01	7	8
2009	Bl	3.6	0.01	10	11
2012	Bl	2.2	0.01	7	8
2016	Bl	2.1	0.02	7	8
2020	Bl	5.8	Sump	4	5
2025	Bl	5.1	Sum	4	5
2034	Bl	8.7	Sump	6	7
2037	Bl	7.7	Sump	5	6
2100	Bl	3.7	0.053	12	13
2102	F	3.2	**	**	**

*cubic feet per second

**see summary of Type F Inlets

Note: All Type F inlets and inlets located at sumps are designed for the 100-year peak flow rate. Inlets on grade are designed for the 50-year peak flow rate.

McMillin Village 7 Vista Verde
Inlet Summary Table (cont'd)

Node Number	Inlet Type	Flow (cfs)*	Approach Slope (ft/ft)	Length of Opening (ft)	Length of Inlet (ft)
3002					
	Bl	6.1	Sump	4	5
3004	Bl			4	5
3009	Bl	2.5		4	5
3012	Bl	3.0		4	5
3016	Bl	1.9		4	5
3019	F	0.7	**	**	**
3022	Bl	0.8	Sum	4	5
3028	Bl	6.5	Sum	4	5
3033	Bl	7.5	Sump	5	6
Basin 11000					
11002	Bl	1.7	Sump	4	5
11004	Bl	3.5	Sump	4	5
Basin 12000					
12043	Bl	7.4	Sump	5	6
12046	Bl	4.3		4	5
12051	Bl	3.3		11	12
12054	Bl	4.5		13	14
12063	Bl	10.5	Sum	7	8
12068	Bl	3.5	0.03	10	11
12081	Bl	0.5		4	5
12083	Bl	4.1		4	5
12091	Bl	5.1	Sump	4	5
12094	Bl	6.3	Sump	4	5
Basin 13000					
13003	Bl	3.5	Sump	4	5
13007	Bl	4.5	Sump	4	5
13013	Bl	3.9	Sump	4	5
13016	Bl	2.3	Sump	4	5
13017	Bl	3.5	Sump	4	5

*cubic feet per second
**see summary of Type F Inlets
Note: All Type F inlets and inlets located at sumps are designed for the lOO-year peak flow rate. Inlets on grade are designed for the SO-year peak flow rate.

McMillin ViJlage 7 Vista Verde
Inlet Summary Table (cont'd)

Node Number	Inlet Type	Flow (cfs)*	Approach Slope (ft/ft)	Length of Opening (ft)	Length of Inlet (ft)
Basin 14000					
14004	Bl	1.3	0.017	5	6
14012	Bl	3.8	0.032	12	13
14017	Bl	4.9	0.032	14	15
14021	Bl	6.5	Sump	4	5
14025	**Bl**	4.3	Sump	4	5

*cubic feet per second
**see summary of Type F Inlets
Note: All Type F inlets and inlets located at sumps are designed for the 100-year peak flow rate. Inlets on grade are designed for the 50-year peak flow rate.

McMillin Village 7 Vista Verde
Type F Inlet Summary Table

Node Number	Flow (cfs*)
1056	0.8
1065	3.9
1071	6.5
2102	3.2
3019	0.7
13016	2.3

*cubic feet per second
Note: All Type F inlets and inlets located at sumps are designed for the 100-year peak flow rate. Inlets on grade are designed for the 50-year peak flow rate.

Riprap calculations have been performed to dissipate the energy that is caused by the outfalls. Tractive force calculations have been performed to determine the correct class of riprap based on the exiting velocity and compared with permissible velocity chart in the 2001 Greenbook. The governing class of riprap was used. Listed below are the classes of riprap used for the McMillin Village 7 Vista Verde Project. RipRap calculations are located in Appendix **J.**

McMillin Village 7 Vista Verde
Riprap Summary Table

Location of Outlet		Exiting Velocity From Pad (fps)*	100-Year Flow Rate (cfs)**
Ba::;in 2000	'/.l ton	3.1	45.5
Basin 11000	Facing	2.0	8.1
Basin 12000	2 ton	5.6	541.2
Basin 14000	Facing	3.3	57.4
DB # 1-2 [1]	2 ton	4.9	295 [2]
DB# 2-3	2 ton	5.2	466

*feet per second
**cubic feet per second
[1] Flow from Detention Basin 1 to 2 and Flow from Detention Basin 2 to 3
[2] The flow shown is half of the total discharge due to 2-72" RCP outlets.
Note: For specific information regarding grouting of the riprap pads see Appendix J.

Based on the City of Chula Vista *Subdivision Manual* Drainage Criteria for Street Systems, a Class II, Secondary Street, and Residential Street must maintain the 50-year storm event below top-of-curb. The McMillin Village 7 project adheres to the City of Chula Vista *Subdivision Manual* and has been designed to convey the 50-year storm event below top-of-curb. Please see the 50-year hydrology output for the interior streets and the 100-year hydrology output for Magdalena Avenue. Also, the inlet calculations in Appendix G show the depths of flow in the street used to calculate the inlet sizes.

DETENTION BASIN DESIGN METHODOLOGY AND CRITERIA

Criteria

Design Storm ..... The detention basin will be designed to attenuate the 2-, l0-, and l00-year storm events for the post-project condition so that the maximum allowable release rate after development shall not exceed the pre-project condition flow rates. This detention criteria is bei ng implemented for this project to mitigate for downstream erosion (2- and 10-year), and to not further impact downstream drainage conditions (100-year).

Methodology

Planning and design of drainage facilities requires analyses of the undetained peak runoff of the watersheds for the pre- and post-project condition. As a result, regional hydrologic analyses were performed using the modified rational method. The modified rational method, as presented, was used for estimating peak discharge for the drainage basin for the pre- and post-project conditions. The United States Army Corps of Engineers' HEC-1 computer program was used to analyze the detention volume required for each basin.

A major component of the project is limiting post-project discharge to no greater than the pre-project peak discharge through the use of detention facilities for the required storm events. The sizing of a detention facility requires an inflow hydrograph to obtain the necessary storage volume. The Rational Method only yields a peak discharge. In order to convert peak discharge into a hydrograph, the Rational Method Hyd rograph Procedure presented in the 2003 San Diego County *Hydrology Manual* was used. The inflow hydrograph was obtained using the Rat Hydro program developed by Rick Engineering Company using the 2003 San Diego County *Hydrology Manual* procedure.

The Rational Method hydrograph procedure is based on the Rational Method formula:

Equation 1

$$Q=CIA$$

Q = peak discharge, in cubic feet per second (cfs)

C = runoff coefficient, proportion of the rainfall that runs off the surface (no units)

I = average rainfall intensity for the duration equal to the time of concentration (Tc) for the area, in inches per hour

A = drainage area contributing to the design location, in acres

An assumption of the Rational Method is that discharge increases linearly over the Tc for the drainage area until reaching the peak discharge as defined by the Rational Method formula, and then decreases linearly.

For designs that are dependent on the total storm volume, a hydrograph must be generated to account for the entire volume of runoff from the 6-hour storm event. The hydrograph for the entire 6-hour storm event is generated by creating a rainfall distribution consisting of blocks of rain, creating an incremental hydrograph for each block of rain, and adding the hydrographs from each block of rain. This process creates a hydrograph that contains runoff from all the blocks of rain and accounts for the entire volume of runoff from the 6-hour storm event. The total volume under the resulting hydrograph is equal to the following equation:

Equation 2

$$VOL = CP6A$$

Where: VOL = volume of runoff (acre-inches)

P6 = 6-hour rainfall (inches)

C = runoff coefficient

A = area of the watershed (acres)

The number of blocks is determined by rounding the Tc to the nearest whole number of minutes, dividing by 360 minutes (6 hours) by Tc, and rounding again to the nearest whole number. The blocks are distributed using a (2/3, 1/3) distribution in which the peak rainfall block is placed at the 4-hour time within the 6-hour rainfall duration. The additional blocks are distributed in a sequence alternating two blocks to the left, and one block to the right of the 4-hour time (See Figure 1). The total amount of rainfall (PT(N)) for any given block (N) is determined as follows:

Equation 3

$$PT(N) = (IT(N)TT(N>) / 60$$

Where: $PT(N)$ = total amount of rainfall for any given block (N)

$lr(N)$ = average rainfall intensity for a duration equal to $T_{T(N)}$ in inches pet" hour

$T_{T(N)}$ = NTc in minutes (N is an integer representing the given block number of rainfall)

Intensity is calculated using the following equation:

Equation 4

$$I = 7.44P_6^{-0.645}$$

Where: [1]=average rainfall intensity for a duration equal to D in inches per hour

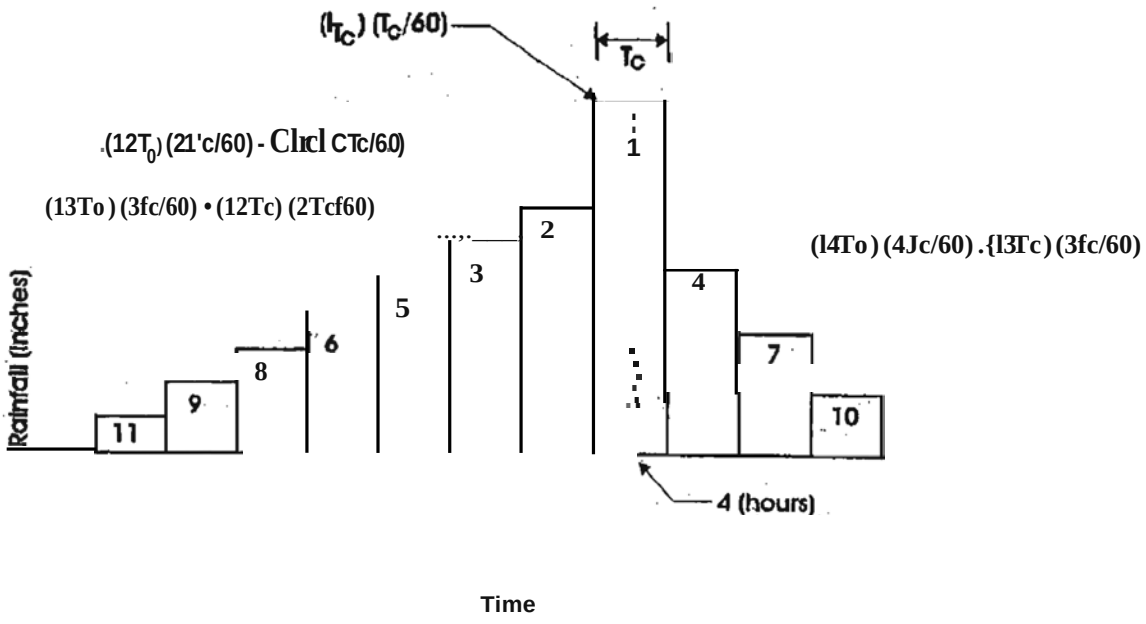
P6 = adjusted 6-hour storm rainfall

D = duration in minutes

Calculations were performed for the 2-, 10-, and 100-year storm events for the detention basin analysis for the Vista Verde project. The results are summarized in the section titled, *Detention Basin Results,* located in this report.

Figure 1

Rainfall Distribution



DETENTION BASIN RESULTS

The Otay Ranch Village 7 project contains a total of three basins in series, two for water quality (Detention Basins 1 is the furthest upstream basin in series & Detention Basin 2 which is immediately downstream of Detention Basin 1), and one for detaining the 2-, 10-, and 100-year peak flows (Detention Basin 3 is the furthest downstream basin in series). The analysis was performed using the most current grading plans for the Otay Ranch Village 7 project.

Analysis for the first two basins consisted of numeric volume sizing guidelines set forth by the City of Chula Vista *Storm Water Management Standards Manual.* A volume was calculated using the following equation:

Volume (V) = (tributary area) x (0.6 inch) x (weighted runoff coefficient)

The equation above yielded a treatment volume of approximately 9.1 ac-ft. Basin 1 was designed to account for 33% of the calculated total volume, V = 3.0 ac-ft and basin 2 was designed to treat the remaining 67%, V = 6.1 ac-ft (please refer to Appendix H for volume based calculation). Based on City of Chula Vista *Storm Water Management Standards Requirements Manual,* the two water quality basins must drain within 48-72 hours. However, to be conservative the outlet structures have been designed to drain within 48 hours. As a result, Basin 1 outlet structure has an orifice diameter of 4-inches and Basin 2 outlet structure has an orifice diameter of 6-inches.

A 20 by 10 by 9 (length by width by height) foot box with a 4-inch orifice opening was designed for Basin 1 to convey the listed stonn events while not exceeding the top-of-basin elevation (refer to Appendix H for the analysis related to the Basin 1 outlet structure), the basin height is approximately 9 feet, with 5 feet below ground. To convey the required flow to Basin 2, the outlet pipe was sized using outlet control. Due to differential head from Basins 1 and 2 the ca1culations resulted in the use of two 72-inch pipes. With this outlet structure in place the 100-year water surface elevation is approximately 524.0 for Basin 1.

Basin 2 contains a 9 by 5 by 11-foot concrete box outlet structure with a 6-inch orifice opening to convey the listed storm events while not exceeding the top-of-basin elevation. The box height is approximately 11 feet from the bottom of the basin with an outlet pipe diameter of 72-inches. The 100-year water surface elevation with the box in place is approximately 519.1 feet in Basin 2.

Basin 3 contains approximately 16.8 ac-ft of storage volume (including freeboard) to detain the post-project flows down to pre-project levels for the 2-, 10-, and 100-year storm events. The outlet structure for Basin 3 consists of a 4 by 4 by 18.5-foot concrete box with an outlet pipe of 72-inches in diameter. The outlet structure is designed to convey the 2-, 10-, and 100-year storm events through a 1.1-foot notched opening. The pre- and post-project flow rates are listed below. The flow rates shown below is the discharge that confluence's with the flows in Magdalena Avenue, then outlet downstream through a 72-inch Reinforced Concrete Pipe (RCP) and conveyed overland, off-site.

Wolf Canyon Extended Detention Basin Summary

Storm Event	Pre-Project Flow Rate (cfs)	Post-Project Detained Flow Rate (cfs)
2	108	106
10	168	161
100	254	233

DESILTING BASIN DESIGN CRITERIA

The McMillin Village 7 Vista Verde project contains 7 desilting basins that are designed based on the City of Chula Vista Subdivision Manuel. The basins were designed to handle the l 0-year storm event and convey the l 00-year storm event through a concrete box riser. The basins were designed with a length equal to twice the width, allowing for travel time. The minimum area (footprint) for the seven basins were calculated based on the Settling Velocity Equation:

$$As = 1.2QNs$$

Where,

As = minimum surface area

Q = discharge rate

Vs = settling velocity

Based on the City of Chula Vista Subdivision Manuel, the basin must contain at least two feet of settling depth, two feet of storage depth, and two feet of freeboard. Note that the riser pipes were sized using the 100-year storm event.

Buoyancy calculations were done to provide stabilization of the concrete box riser, please see Appendix I for desilting basin calculations.

CONCLUSION

This report presents a drainage study for the McMillin Village 7 Vista Verde project. Included in this drainage study are pre-project hydrologic analyses for the 2-, 10-, and 100-year storm event, post-project hydrologic analyses for the 50-, and 100-year storm event, hydraulic pipeflow analyses for the 50-year storm event, and inlet and brow ditch calculations. In addition, 100-year hydrologic and hydraulic analysis were ran for the major storm drain crossing in Magdalena Avenue and for all brow ditches, inlets in a sump and riprap pads. Furthermore, analyses have been included for the Wolf Canyon Water Quality and Extended Detention Basin that is sized for water quality and detaining the 2-, I 0-, and 100-year storm events to at or below pre-project levels.

APPENDIX A

2-, 10-, and 100-Year Rational Method Results for the Pre-Project Condition

2-YEAR

```
****** ********** ******************************************************  ***** * *

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2000 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2000  License ID 1261

                              Analysis prepared by:

                            Rick Engineering Company
                                5620 Friars Road
                              San Diego, CA  92110
                                 (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
 * Otay Ranch Village 7   J-             08/14/03                          *
* 2-Year Storm Event
 * Basin 400    Existing Condition                                         *
 *************** ************************** ************************* *****

  FILE NAME:  1HV784EX.DAT
  TIME/DATE OF STUDY: 17:40 09/22/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  1985 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR)     2.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.170
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN  TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)    SIDE / SIDE/ WAY     (FT)     (FT)  (FT)   (FT)    (n)

  1   30.0     20.0    0.018/0.018/0.020    0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

******* ************ ******************** ********************** *** **********
  FLOW PROCESS FROM NODE    400.00 TO NODE    402.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION (APPENDIX X-A)
  WITH 10-MINUTES ADDED =  13.09(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =   500.00
  UPSTREAM ELEVATION =    662.40
```

```
 DOWNSTREAM ELEVATION =     640.00
 ELEVATION DIFFERENCE =     22.40
    2 YEAR RAINFALL INTENSITY(INCH/HOUR)     1.657
 SUBAREA RUNOFF(CFS)         1.91
 TOTAL AREA(ACRES) =      2.30   TOTAL RUNOFF(CFS)         1.91

****** ******************************  ************ ***************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    402.00 IS CODE =  22

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) =   0
 USER SPECIFIED Tc(MIN.) =    9.090
    2 YEAR RAINFALL INTENSITY(INCH/HOUR)    2.096
 SUBAREA RUNOFF(CFS)         2.41
 TOTAL AREA(ACRES) =      2.30   TOTAL RUNOFF(CFS)         2.41

************ ********************************  ***************** ******* ******
 FLOW PROCESS FROM NODE    402.00 TO NODE    404.00 IS CODE =  51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (NEW ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =    640.00 DOWNSTREAM(FEET)      530.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2780.00 CHANNEL SLOPE    0.0396
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      2.41
 FLOW VELOCITY(FEET/SEC) =   1.87   FLOW DEPTH(FEET) =   0.19
 TRAVEL TIME(MIN.) =  24.84   Tc(MIN.) =  33.93
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    404.00    3280.00 FEET.

****************** ******************************************.  ***'**** * ***
 FLOW PROCESS FROM NODE    402.00 TO NODE    404.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.897
 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .5000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)     64.20  SUBAREA RUNOFF(CFS)      28.78
 TOTAL AREA(ACRES)      66.50   TOTAL RUNOFF(CFS) =   31.19
 TC(MIN) =  33.93

****** ******* ********** ************************************  ********* *******
 FLOW PROCESS FROM NODE    402.00 TO NODE    404.00 IS CODE =   1

 >>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)    33.93
 RAINFALL INTENSITY(INCH/HR) =   0.90
 TOTAL STREAM AREA(ACRES) =   66.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.19

****** ************************************************************k   ** ****
 FLOW PROCESS FROM NODE    406.00 TO NODE    408.00 IS CODE =  21
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION (APPENDIX X-A)
  WITH 10-MINUTES ADDED =  12.88(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =   500.00
  UPSTREAM ELEVATION =    667.00
  DOWNSTREAM ELEVATION =    640.00
  ELEVATION DIFFERENCE =     27.00
     2 YEAR RAINFALL INTENSITY(INCH/HOUR)     1.675
  SUBAREA RUNOFF(CFS)         2.26
  TOTAL AREA(ACRES) =      2.70   TOTAL RUNOFF{CFS)         2.26

**************************************************************   * ** *******
  FLOW PROCESS FROM NODE    406.00 TO NODE    408.00 IS CODE =  22

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .5000
  S.C.S. CURVE NUMBER {AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    8.880
     2 YEAR RAINFALL INTENSITY{INCH/HOUR)    2.128
  SUBAREA RUNOFF(CFS)         2.87
  TOTAL AREA(ACRES) =      2.70   TOTAL RUNOFF{CFS)         2.87

**************************************************** ********************.*******
  FLOW PROCESS FROM NODE    408.00 TO NODE    404.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRO SUBAREA (NEW ELEMENT)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET)       530.00
  CHANNEL LENGTH THRU SUBAREA{FEET) =  2500.00   CHANNEL SLOPE    0.0440
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLQW THRU SUBAREA(CFS) =      2.87
  FLOW VELOCITY(FEET/SEC) =   2.01   FLOW DEPTH(FEET) =   0.20
  TRAVEL TIME(MIN.) =  20.71   Tc(MIN.) =  29.59
  LONGEST FLOWPATH FROM NODE    406.00 TO NODE    404.00    3000.00 FEET.

*********************************. ************************  ***************** *
  FLOW PROCESS FROM NODE    408.00 TO NODE    404.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
Z========================   ========================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.979
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)     64.70  SUBAREA RUNOFF(CFS)      31.68
  TOTAL AREA(ACRES)      67.40   TOTAL RUNOFF{CFS) =   34.55
  TC(MIN) =  29.59

************** * ***********************************************   ******.k **k ****
  FLOW PROCESS FROM NODE    408.00 TO NODE    404.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE;
TIME OF CONCENTRATION(MIN.)    29.59
RAINFALL INTENSITY(INCH/HR} =    0.98
TOTAL STREAM AREA(ACRES ) =   67.40
PEAK FLOW RATE(CFS) AT CONFLUENCE =      34.55

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc       INTENSITY      AREA
NUMBER      (CFS)    (MIN.}   (INCH/HOUR)    (ACRE)
     ▮       31.19    33.93        0.897        66.50
     2       34.55    29.59        0.979        67.40

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc       INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       63.11    29.59        0.979
     2       62.82    33.93        0.897

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS)       63.11   Tc(MIN.) =   29.59
TOTAL AREA(ACRES) =     133.90
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    404.00    3280.00 FEET.

************** ********** **** ************************** *****************" **
FLOW PROCESS FROM NODE    404.00 TO NODE    409.00 IS CODE =  51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM( FEET)      518.00
CHANNEL LENGTH THRU SUBAREA( FEET) =   300.00   CHANNEL SLOPE    0.0400
CHANNEL BASE( FEET) =    5.00   "Z" FACTOR =  10.000
MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
CHANNEL FLOW THRU SUBAREA(CFS) =     63.11
FLOW VELOCITY( FEET/SEC) =   4.57   FLOW DEPTH(FEET) =   0.95
TRAVEL TIME(MIN.) =  1.09   Tc(MIN.) =  30.69
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    409.00    3580.00 FEET.

******* ***************** ***** ********** ** **** ********************* ********
FLOW PROCESS FROM NODE    404.00 TO NODE    409.00 IS CODE =  81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.956
*USER SPECIFIED(SUBAREA):
RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .5000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES)      8.00  SUBAREA RUNOFF(CFS)       3.83
TOTAL AREA(ACRES)     141.90   TOTAL RUNOFF(CFS) =   66.93
TC (MIN) =  30.69

****** ********************************************k    ***************  •k *******
FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
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  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =    518.00  DOWNSTREAM(FEET)       430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2300.00  CHANNEL SLOPE      0.0383
  CHANNEL BASE( FEET) =    5.00    ttztt FACTOR =   5.000
  MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    66.93
  FLOW VELOCITY{FEET/SEC) =   5.31   FLOW DEPTH(FEET) =   1.16
  TRAVEL TIME(MIN.) =   7.22   Tc(MIN. ) =  37.90
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00    5880.00 E'EET.

****************************************************************    ********
  FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.835
  *USER  SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)     98.50  SUBAREA RUNOFF(CFS)      41.11
  TOTAL AREA(ACRES)     240.40   TOTAL RUNOFF(CFS) =  108.04
  TC(MIN) =  37.90

******************************** **** ********** ***** ********** ***** *
  FLOW PROCESS FROM NODE    410.00 TO NODE    412.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =    430.00  DOWNSTREAM( FEET)      377.00
  CHANNEL LENGTH THRO SUBAREA(FEET) =  2180.00   CHANNEL SLOPE    0.0243
  CHANNEL BASE(FEET) =    5 .00   "Ztt FACTOR =   5.000
  MANNING'S FACTOR = 0.045   MAXIMUM DEPTH (FEET) =   5.00
  CHANNEL FLOW THRO SUBAREA(CFS) =    108.04
  FLOW VELOCITY(FEET/SEC) =   5.09   FLOW DEPTH(FEET) =   1.62
  TRAVEL TIME(MIN.) =   7.14   Tc(MIN.) =  45.04
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    412.00    8060.00 FEET.

******************** ********************** ************.****** * **** *****
  FLOW PROCESS FROM NODE    410.00 TO NODE    412.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.747
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)   102.80    SUBAREA RUNOFF(CFS)     38.38
  TOTAL AREA(ACRES)     343.20   TOTAL RUNOFF(CFS) =  146.42
  TC(MIN) =  45.04

****** ******* * ***** ************** ***************** ************ *.**** ********
  FLOW PROCESS FROM NODE    412.00 TO NODE    414.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============== ;============================================================
  ELEVATION DATA: UPSTREAM( FEET) =    377.00  DOWNSTREAM( FEET)      348.00
  CHANNEL LENGTH THRO SUBAREA(FEET) =   940.00   CHANNEL SLOPE =  0.0309
  CHANNEL BASE( FEET) =    5.00    ttztt FACTOR =   3.300
```

```
 MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    146.42
 FLOW VELOCITY(FEET/SEC) =   6.58   FLOW DEPTH(FEET) =   1.95
 TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =  47.42
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    414.00    9000.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    412.00 TO NODE    414.00 rS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.722
 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .5000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)     40.80   SUBAREA RUNOFF(CFS)     14.74
 TOTAL AREA(ACRES) =   384.00   TOTAL RUNOFF(CFS) =  161.16
 TC(MIN} =  47.42

 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)          384.00  TC(MIN.) =     47.42
 PEAK FLOW RATE(CFS)        161.16


 END OF RATIONAL METHOD ANALYSIS
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J O-YEAR

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2000 Advanced Engineering Software (aes)
              Ver. l.5A Release Date: 01/01/2000  License ID 1261

                           Analysis prepared by:

                          Rick Engineering Company
                              5620 Friars Road
                            San Diego, CA  92110
                              (619) 291-0707

 ************************* DESCRIPTION OF STUDY ***************************
* Otay Ranch Village 7    J-              08/14/03                          *
* 10-Year Storm Event                                                       *
* Basin 400     Existing Condition
 ************************************************************************     *****

  FILE NAME: 10V7B4EX.DAT
  TIME/DATE OF STUDY: 17:46 09/22/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  1985 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR)     10.00
  6-HOOR DURATION PRECIPITATION (INCHES) =    1.730
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO  STREET-CROSSFALL:  CURB  GUTTER-GEOMETRI ES:  MANNING
     WIDTH   CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)

  1   JO.O     20.0    0.018/0.018/0.020    0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

********************************* ***************************** * * **** ******
  FLOW PROCESS FROM NODE    400.00 TO NODE    402.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================   ================================
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION (APPENDIX X-A)
  WITH 10-MINUTES ADDED =  13.09(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =   500.00
  UPSTREAM ELEVATION =    662.40
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  DOWNSTREAM ELEVATION =     640.00
  ELEVATION DIFFERENCE =      22.40
    10 YEAR RAINFALL INTENSITY{INCH/HOUR)     2.450
  SUBAREA RUNOFF(CFS)         2.82
  TOTAL AREA(ACRES) =       2.30   TOTAL RUNOFF(CFS)         2.82

****************************************************************************
  FLOW PROCESS FROM NODE     400.00 TO NODE     402.00 IS CODE =  22

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=======.:==================== ===========-----=======:==":":======== ==========
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .5000
  S.C.S. CURVE NUMBER (AMC II) =    0
  USER SPECIFIED Tc(MIN. ) =     9.090
    10 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.100
  SUBAREA RUNOFF{CFS)         3.56
  TOTAL AREA(ACRES)  =       2.30   TOTAL RUNOFF(CFS)         3.56

****** ************************************************************   *********
  FLOW PROCESS FROM NODE     402.00 TO NODE     404.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (NEW ELEMENT)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =     640.00DOWNSTREAM(FEET)          ')30.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2780.00CHANNEL SLOPE        0.0396
  CHANNEL BASE(FEET) =     5.00   "Z" FACTOR = 10.000 MANNING'S
  FACTOR = 0.045              MAXIMUM DEPTH{FEET) =    5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.56
  FLOW VELOCITY(FEET/SEC) =    2.08   FLOW DEPTH(FEET) =    0.23
  TRAVEL TIME(MIN.) =  22.28   Tc(MIN.) =  31.37
  LONGEST FLOWPATH FROM NODE     400.00 TO NODE     404.00    3280.00 fEET.

****************************************************     ********** A  k ******
  FLOW PROCESS FROM NODE     402.00 TO NODE     404.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.394
  *USER SPECIFIED(SUBAREA) :
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .5000
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES)      64.20   SUBAREA RUNOFF(CFS)      44.76
  TOTAL AREA(ACRES)       66.50   TOTAL RUNOFF(CFS) =    48.32
  TC(MIN) =  31.37

**********************************k ****************'************************
  FLOW PROCESS FROM NODE     402.00 TO NODE     404.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
== ==[illegible]
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION (MIN.)    31.37
  RAINFALL INTENSITY(INCH/HR) =   1.39
  TOTAL STREAM AREA(ACRES) =    66.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      48.32

*************** ********************** ******************** *******.********
  FLOW PROCESS FROM NODE     406.00 TO NODE     408.00 IS CODE =  21
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  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA ):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION  (APPENDIX X-A)
  WITH 10-MINUTES ADDED =  12.88(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =   500.00
  UPSTREAM ELEVATION =    667.00
  DOWNSTREAM ELEVATION =    640.00
  ELEVATION DIFFERENCE =     27.00
    10 YEAR  RAINFALL  INTENSITY(INCH/HOUR)    2.476
  SUBAREA RUNOFF(CFS)         3.34
  TOTAL AREA(ACRES) =      2.70   TOTAL RUNOFF(CFS)         3.34

**************************************************** ********************
  FLOW PROCESS FROM NODE    406.00 TO NODE    408.00 IS CODE =  22

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER  SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN. ) =
                                   8
  .880
    10 YEAR RAINFALL  INTENSITY(INCH/HOUR)    3.147
  SUBAREA RUNOFF(CFS)         4.25
  TOTAL AREA(ACRES) =      2.70   TOTAL RUNOFF(CFS )         4.25

****** ******************* ********** * ******* **.*******'***********.*** *******
  FLOW PROCESS FROM NODE    408.00 TO NODE    404.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (NEW ELEMENT)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =  640.00 DOWNSTREAM( FEET)      530.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2500.00 CHANNEL SLOPE    0.0440
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      4.25
  FLOW VELOCITY( FEET/SEC) =   2.28   FLOW DEPTH(FEET) =   0.25
  TRAVEL TIME(MIN.) =  18.28   Tc(MIN.) =  27.16
  LONGEST FLOWPATH FROM NODE    406.00 TO NODE    404.00    3000.00 FEET.

*********************************************.******   ********* ****** *********
  FLOW PROCESS FROM NODE    408.00 TO NODE    404.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================== ======================================  ===
    10 YEAR  RAINFALL  INTENSITY (INCH/HOUR) =  1.530
  *USER SPECIFIED(SUBAREA):
  RURAL  DEVELOPMENT  RUNOFF COEFFICIENT =  .5000
  S.C.S. CURVE NUMBER  (AMC II) =   0
  SUBAREA AREA(ACRES)      64.70   SUBAREA RONOFF(CFS)     49.50
  TOTAL AREA(ACRES)       67.40   TOTAL RUNOFF(CFS) =   53.75
  TC(MIN) =  27.16

*********************************************    ***************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    404.00 rs CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)    27.16
  RAINFALL INTENSITY(INCH/HR) =   1.53
  TOTAL STREAM AREA(ACRES) =   67.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     53.75

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       48.32    31.37        1.394        66.50
      2       53.75    27.16        1.530        67.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       97.78    27.16        1.530
      2       97.30    31.37        1.394

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)       97.78   Tc(MIN.) =   27.16
  TOTAL AREA(ACRES) =       133.90
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    404.00    3280.00 E"'EET.

****************************  ******************************  ************* *****
  FLOW PROCESS FROM NODE    404.00 TO NODE    409.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM( FEET)      518.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE    0.0400
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEETJ =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     97.78
  FLOW VELOCITY(FEET/SEC) =   5.10   FLOW DEPTH(FEET) =   1.16
  TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =  28.14
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    409.00    3580.00 E'EE:T.

**********  ***********  **********************************  *********  **********
  FLOW PROCESS FROM NODE    404.00 TO NODE    409.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.495
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)      8.00   SUBAREA RUNOFF(CFS)      5.98
  TOTAL  AREA(ACRES)     141.90   TOTAL RUNOFF(CFS) =  103.'77
  TC(MIN) =  28.14

**********************************************   ************************* *
  FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) =    518.00  DOWNSTREAM(FEET)      430.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  2300.00   CHANNEL SLOPE    0.0383
CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
CHANNEL FLOW THRU SUBAREA(CFS) =    103.77
FLOW VELOCITY(FEET/SEC) =   5.96   FLOW DEPTH(FEET) =   1.43
TRAVEL TIME(MIN.) =   6.43   Tc(MIN.) =  34.57
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00    5880.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.310
*USER SPECIFIED(SUBAREA):
RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .5000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES)     98.50  SUBAREA RUNOFF(CFS)       64.50
TOTAL AREA(ACRES)     240.40   TOTAL RUNOFF(CFS) =  168.26
TC(MIN) =  34.57

****************************************************************************
FLOW PROCESS FROM NODE    410.00 TO NODE    412.00 IS CODE =  51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) =    430.00  DOWNSTREAM(FEET)      377.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  2180.00   CHANNEL SLOPE -  0.0243
CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
CHANNEL FLOW THRU SUBAREA(CFS) =    168.26
FLOW VELOCITY(FEET/SEC) =   5.71   FLOW DEPTH(FEET) =   1.98
TRAVEL TIME(MIN.) =   6.36   Tc(MIN.) =  40.94
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    412.00    8060.00 FEET.

****************************************************    * * ** ********* ****
FLOW PROCESS FROM NODE    410.00 TO NODE    412.00 IS CODE =  81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=  ===;============================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.174
*USER SPECIFIED(SUBAREA):
RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES)   102.80   SUBAREA RUNOFF(CFS)       60.36
TOTAL AREA(ACRES)     343.20   TOTAL RUNOFF(CFS) =  228.63
TC(MIN) =  40.94

********************************* ****************************************
FLOW PROCESS FROM NODE    412.00 TO NODE    414.00 IS CODE =  51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRO SUBAREA (EXISTING ELEMENT)<<<<<
======;=============== = =====  ========================================
ELEVATION DATA: UPSTREAM(FEET) =    377.00  DOWNSTREAM(FEET)      348.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   940.00   CHANNEL SLOPE =  0.0309
CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   3.300
```

```
 MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    228.63
 FLOW VELOCITY(FEET/SEC) =   7.38   FLOW DEPTH(FEET) =   2.40
 TRAVEL TIME(MIN.) =   2.12   Tc(MIN.) =  43.06
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    414.00    9000.00 FEET.

****************************************************    *********************
 FLOW PROCESS FROM NODE    412.00 TO NODE    414.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.137
 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SOBAREA AREA(ACRES)      40.80   SUBREA  RUNOFF(CFS)      23.19
 TOTAL AREA(ACRES) =   384.00   TOTAL RUNOFF(CFS) =  251.82
 TC(MIN) =  43.06

 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)          384.00  TC(MIN.) =     43.06
 PEAK FLOW RATE(CFS)        251.82


 END OF RATIONAL METHOD ANALYSIS
```

100-YEAR

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2000 Advanced Engineering Software (aes)
              Ver. l.SA Release Date: 01/01/2000  License ID 1261

                          Analysis prepared by:

                         Rick Engineering Company
                             5620 friars Road
                           San Diego, CA  92110
                              (619) 291-0707

 ************************* DESCRIPTION OF STUDY **************************
* Otay Ranch Village 7    J-             08/14/03                        *
* 100-Year Storm Event                                                   *
* Basin 400     Existing Condition                                       *
 ************************   ***********************************************

  FILE NAME: 1HV7B4EX.DAT
  TIME/DATE OF STUDY: 08:31 08/18/2003

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  1985 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =    2.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONE"'LUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO  STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN- / OUT/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     {FT)    SIDE / SIDE/ WAY    (FT)    WT)  (FT)  (FT)    (n)

  1   30.0     20.0    0.018/0.018/0 .020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 {FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*****************  ******************************** ***********************
  FLOW PROCESS FROM NODE    400.00 TO NODE    402.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ========================================================================
  *USER SPECIFIED(SUBAREA) :
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION (APPENDIX X-A)
  WITH 10-MINUTES ADDED =  13.09{MINUTES)
  INITIAL SOBAREA FLOW-LENGTH =   500.00
  UPSTREAM ELEVATION =    662.40
```

```
  DOWNSTREAM ELEVATION =     640.00
  ELEVATION DIFFERENCE =      22.40
   100 YEAR RAINFALL INTENSITY(INCH/HOURJ    3.540
  SUBAREA RUNOFF(CFS)         4.07
  TOTAL AREA(ACRES) =      2.30   TOTAL RUNOFF(CFS)         4.07

******'**************************** ** ****************** ******** ***********
  FLOW PROCESS FROM NODE     400.00 TO NODE     402.00 IS CODE =  22

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
====================== ============.================ ======-================== =
  *USER  SPECIFIED(SUBAREA ):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    9.090
   100 YEAR RAINFALL INTENSITY(INCH/HOUR)    4.480
  SUBAREA RUNOFF(CFS)         5.15
  TOTAL AREA(ACRES) =      2.30   TOTAL RUNOFF(CFS)         5.15

******** ********************** ***************** ******* ******************
  FLOW PROCESS FROM NODE     402.00 TO NODE     404.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (NEW ELEMENT)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET)      530.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2780.00   CHANNEL SLOPE    0.0396
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.15
  FLOW VELOCITY(FEET/SEC) =   2.30   FLOW DEPTH(FEET) =   0.29
  TRAVEL TIME(MIN.) =  20.14   Tc(MIN.) =  29.23
  LONGEST FLOWPATH FROM NODE     400.00 TO NODE     404.00    3280.00 FEET.

****************************************  ************* **********************
  FLOW PROCESS FROM NODE     402.00 TO NODE     404.00 IS CODE =  Bl

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.109
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)     64.20   SUBAREA RUNOFF(CFS)     67.70
  TOTAL AREA(ACRES)      66.50   TOTAL RUNOFF(CFS) =   72.85
  TC(MIN) =  29.23

****** ****************************  ********************************.K *******
  FLOW PROCESS FROM NODE     402.00 TO NODE     404.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================== == ====================== =======
  TOTAL NUMBER OF STREAMS = 2
  CONfLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION (MIN.)    29.23
  RAINFALL INTENSITY(INCH/HR) =   2.11
  TOTAL STREAM AREA(ACRES) =   66.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     72.85

*********************************************  ********************** **
  FLOW PROCESS FROM NODE     406.00 TO NODE     408.00 IS CODE =  21
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =  0
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION (APPENDIX X-A)
  WITH 10-MINUTES ADDED =  12.88(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =  500.00
  UPSTREAM ELEVATION =  667.00
  DOWNSTREAM ELEVATION =  640.00
  ELEVATION DIFFERENCE =  27.00
   100 YEAR RAINFALL INTENSITY(INCH/HOOR)  3.578
  SUBAREA RUNOFF(CFS)  4.83
  TOTAL AREA(ACRES) =  2.70  TOTAL RUNOFF(CFS)  4.83

****** ************************************************  ********************
  FLOW PROCESS FROM NODE  406.00 TO NODE  408.00 IS CODE =  22

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .5000
  S.C.S. CURVE NUMBER (AMC II) =  0
  USER SPECIFIED Tc(MIN.) =  8.880
   100 YEAR RAINFALL INTENSITY(INCH/HOUR)  4.548
  SUBAREA RUNOFF(CFS)  6.14
  TOTAL AREA(ACRES) =  2.70  TOTAL RUNOFF(CFS)  6.14

****** ***********************  **** ****************************************
  FLOW PROCESS FROM NODE  408.00 TO NODE  404.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>»TRAVELTIME THRU SUBAREA (NEW ELEMENT)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =  640.00  DOWNSTREAM(FEET)  530.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2500.00  CHANNEL SLOPE  0.0440
  CHANNEL BASE(FEET) =  5.00  "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.045  MAXIMUM DEPTH(FEET) =  5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =  6.14
  FLOW VELOCITY(FEET/SEC) =  2.53  FLOW DEPTH(FEET) =  0.30
  TRAVEL TIME(MIN.) =  16.46  Tc(MIN.) =  25.34
  LONGEST FLOWPATH FROM NODE  406.00 TO NODE  404.00  3000.00 FEET.

********************************  ***************** ***************k *******
  FLOW PROCESS FROM NODE  408.00 TO NODE  404.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========  ===========================================  =========== ============
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.312
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =  0
  SUBAREA AREA(ACRES}  64.70  SUBAREA RUNOFF(CFS)  74.80
  TOTAL AREA(ACRES)  67.40  TOTAL RUNOFF(CFS) =  80.94
  TC(MIN) =  25.34

****** ************ *************** *** ************************************
  FLOW PROCESS FROM NODE  408.00 TO NODE  404.00 IS CODE =  1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)     25.34
  RAINFALL INTENSITY(INCH/HR) =   2.31
  TOTAL STREAM AREA(ACRES) =    67.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     80.94

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       72.85    29.23        2.109         66.50
      2       80.94    25.34        2.312         67.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc       INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      147.39    25.34       2.312
      2      146.68    29.23       2.109

  COMPUTED CONFLUENCE ESTIMATES ARE AS E'OLLOWS:
  PEAK FLOW RATE(CFS)      147.39   Tc(MIN.) =   25.34
  TOTAL AREA(ACRES) =    133.90
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    404.00    3280.00 FEET.

***************   ************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    409.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM(FEET)      518.00
  CHANNEL LENGTH THRU SUBAREA(FEET)=   300.00   CHANNEL SLOPE    0.0400
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =   147.39
  FLOW VELOCITY(FEET/SEC) =   5.65   FLOW DEPTH(FEET) =   1.38
  TRAVEL TIME(MIN.)    0.88   Tc(MIN.) =  26.23
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    409.00    3580.00 FEET.

****************************************************    ***************
  FLOW PROCESS FROM NODE    404.00 TO NODE    409.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
====== ========================== ========================;============
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.262
  *USER SPECIFIED(SUBAREA);
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES)      8.00   SUBAREA RUNOFF(CFS)      9.05
  TOTAL AREA(ACRES)     141.90   TOTAL RUNOFF(CFS) =  156.44
  TC(MIN)    26.23

*******************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
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>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) =    518.00  DOWNSTREAM(FEET)      430.00
CHANNEL LENGTH THRU SUBAREA( FEET) =  2300.00   CHANNEL SLOPE    0.0383
CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.045   MAXIMUM DEPTH (FEET) =   5.00
CHANNEL FLOW THRU SUBAREA(CFS) =    156.44
FLOW VELOCITY( FEET/SEC) =   6.64   FLOW DEPTH(FEET) =   1.73
TRAVEL TIME(MIN.) =   5.77   Tc (MIN.)= 32.00
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00    5880.00 FEET.

****************************************************************   * *.*.******
FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.989
*USER SPECIFIED(SUBAREA):
RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES)     98.50  SUBAREA RUNOFF(CFS)      97.98
TOTAL AREA(ACRES)     240.40   TOTAL RUNOFF(CFS) =  254.42
TC(MIN) =  32.00

****************************************************************    *****
FLOW PROCESS FROM NODE    410.00 TO NODE    412.00 IS CODE =  51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) =    430.00  DOWNSTREAM( FEET)      377.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  2180.00   CHANNEL SLOPE    0.0243
CHANNEL BASE( FEET) =    5.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.045   MAXIMUM DEPTH( FEET) =   5.00
CHANNEL FLOW THRU SUBAREA(CFS) =    254.42
FLOW VELOCITY(FEET/SEC) =   6.35   FLOW DEPTH(FEET) =   2.38
TRAVEL TIME(MIN.) =   5.73   Tc{MIN.)=  37.72
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    412.00    8060.00 FEET.

********************** ******************************** ***************** *
FLOW PROCESS FROM NODE    410.00 TO NODE    412.00 IS CODE =  81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.789
*USER SPECIFIED(SUBAREA):
RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES )    102.80  SUBAREA RUNOFF(CFS)      91.95
TOTAL AREA(ACRES)     343.20   TOTAL RUNOFF(CFS) =  346.37
TC{MIN) =  37.72

*********** ********************************** ******** * **** *************** *
FLOW PROCESS FROM NODE    412.00 TO NODE    414.00 IS CODE =  51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) =    377.00  DOWNSTREAM(FEET)      348.00
CHANNEL LENGTH THRO SUBAREA(FEET) =   940.00       CHANNEL      0.0309
SLOPE = CHANNEL BASE (FEET) =   5.00 "Z" FACTOR =
                        3.300
```

```
 MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    346.37
 FLOW VELOCITY(FEET/SEC) =   8.22   FLOW DEPTH(FEET) =   2.89
 TRAVEL TIME(MIN.) =   1.91   Tc(MIN.) =  39.63
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    414.00    9000.00 FEET.

****************************************************   * ***************
 FLOW PROCESS FROM NODE    412.00 TO NODE    414.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.733
 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)     40.80   SUBAREA RUNOFF(CFS)     35.35
 TOTAL AREA(ACRES) =   384.00   TOTAL RUNOFF(CFS) =  381.72
 TC(MIN) =  39.63

 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)          384.1   TC(MIN.) =     39.63
 PEAK FLOW RATE(CFS)        381.72

================================   =====================================
 END OF RATIONAL METHOD ANALYSIS

1
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APPENDIX B

50-Year Rational Method Results for the Post-Project Condition

SYSTEM 1000

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                            Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                          San Diego, California 92110
                        619-291-0707    Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* MCMILLIN OTAY RANCH, VILLAGE 7                                         *
* SO-YEAR STORM EVENT FOR BASIN 1000                                     *
* JN-14531A    SEPT 22,2004                                              *
 **************************************************************************

  FILE NAME: lOOOA.DAT
  TIME/DATE OF STUDY: 08:42 09/27/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------|------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL} TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1}   5.000;  5.800
   2}  10.000;  3.700
   3}  15.000;  2.800
   4)  20.000;  2.400
   5)  25.000;  2.000
   6)  30.000;  1.800
   7)  40.000;  1.500
   8)  50.000;  1.300
   9)  60.000;  1.200
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL   IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    {FT)      (FT)    SIDE / SIDE/ WAY     (FT)    (FT)  (FT)  (FT)    (n)

  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   16.0     11.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)* {Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
---,------------------------------  ----------- ------- ----------------------
  *USER SPECIFIED(SUBAREA) :
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
```

```
  S.C.S. CURVE NUMBER (AMC II) =    0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.20(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    583.50
  DOWNSTREAM ELEVATION(FEET) =    581.40
  ELEVATION DIFFERENCE(FEET) =      2.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.198
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.877
  SUBAREA RUNOFF(CFS)        0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1002.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================;==========   ==============
  UPSTREAM ELEVATION(FEET) =  581.40  DOWNSTREAM ELEVATION(FEET) =  572.60
  STREET LENGTH(FEET) =   602.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         3.25
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.32
    AVERAGE FLOW VELOCITY(FEET/SEC.)       2.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.79
  STREET FLOW TRAVEL TIME(MIN.) =   4.22   Tc(MIN.)    11.42
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.444
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES)       2.40      SUBAREA RUNOFF(CFS)      5.79
  TOTAL AREA(ACRES) =       2.50        PEAK FLOW RATE(CFS)         6.10

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET)    14.50
  FLOW VELOCITY(FEET/SEC.) =  2.79   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1002.00 =   702.00 FEET.

 ****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1003.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========  ==============================  ===========; =================
  ELEVATION DATA: UPSTREAM(FEET) =   560.00  DOWNSTREAM(FEET)      557.80
  FLOW LENGTH(FEET) =    21.80   MANNING'S N  ;  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)    13.85
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      6.10
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  11.45
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1003.00     723.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1004.00 IS CODE =  31
```

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
------------------------------------------------------------------------
ELEVATION DATA: UPSTREAM(FEET) =   557.40  DOWNSTREAM(FEET)     553.40
FLOW LENGTH(FEET) =   211.40   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.)     7.53
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
PIPE-FLOW(CFS) =      6.10
PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =  11.92
LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1004.00     935.20 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1004.00 TO NODE   1005.00 IS CODE =  31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
------------------------------------------------------------------------
ELEVATION DATA: UPSTREAM(FEET) =   553.10  DOWNSTREAM(FEET)      547.50
FLOW LENGTH(FEET) =   278.40   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS8.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.)     7.71
ESTIMATED PIPE DIAMETER(INCH) =           NUMBER OF PIPES     1
18.00 PIPE-FLOW(CFS) =6.10
PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =  12.52
LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1005.00    1213.60 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1005.00 TO NODE   1005.00 IS CODE =   1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
------------------------------------------------------------------------
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN. )    12.52
RAINFALL INTENSITY(INCH/HR)  =   3.25
TOTAL STREAM AREA(ACRES) =     2.50
PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.10

****************************************************************************
FLOW PROCESS FROM NODE   1008.00 TO NODE   1007.00 IS CODE =  21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
------------------------------------------------------------------------
*USER SPECIFIED(SUBAREA) :
MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
S.C.S. CURVE NUMBER (AMC II) =   0
URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.25(MIN.)
INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
UPSTREAM ELEVATION(FEET) =    574.50
DOWNSTREAM ELEVATION(FEET)  =    572.60
ELEVATION DIFFERENCE(FEET)  =      1.90
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.245
  50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.857
SUBAREA RUNOFF(CFS)        0.32
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
FLOW PROCESS FROM NODE   1007.00 TO NODE   1006.00 IS CODE =  62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  2 USED)<<<<<
------------------------------------------------------------------------
UPSTREAM ELEVATION(FEET) =  572.60  DOWNSTREAM ELEVATION(FEET) =  556.90
```

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  STREET LENGTH(FEET)= 524.60   CURB HEIGHT(INCHES)    6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.24
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    8.31
    AVERAGE FLOW VELOCITY(FEET/SEC.)      2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.78
  STREET FLOW TRAVEL TIME(MIN.) =   3.03   Tc(MIN.)    10.27
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.651
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER  (AMC II) =   0
  SUBAREA AREA(ACRES)      1.50      SUBAREA RUNOFF(CFS)      3.83
  TOTAL AREA(ACRES) =      1.60        PEAK FLOW RATE(CFS)         4.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET)    10.80
  FLOW VELOCITY(FEET/SEC.) =  3.31   DEPTH*VELOCITY(FT*FT/SEC.)     1.06
  LONGEST FLOWPATH FROM NODE   1008.00 TO NODE   1006.00 =   624.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1006.00 TO NODE   1005.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============= ============= =============== ================================
  ELEVATION DATA: UPSTREAM(FEET) =   548.10  DOWNSTREAM(FEET)      547.50
  FLOW LENGTH(FEET) =     6.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)    12.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      4.15
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =  10.28
  LONGEST FLOWPATH FROM NODE   1008.00 TO NODE   1005.00 =   630.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1005.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================== =   === ====== ==== ========== ==================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)    10.28
  RAINFALL INTENSITY(INCH/HR) =   3.65
  TOTAL STREAM AREA(ACRES) =     1.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.15

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        6.10    12.52        3.247          2.50
      2        4.15    10.28        3.649          1.60

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
```

```
 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1        9.58     10.28        3.649
     2        9.79     12.52        3.247

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)         9.79   Tc(MIN.) =    12.52
 TOTAL AREA(ACRES) =       4.10
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1005.00 =  1213.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1005.00 TO NODE   1005.00 IS CODE =  10

 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========  ========================== ========== ======================== =====

****************************************************************************
 FLOW PROCESS FROM NODE   1011.00 TO NODE   1010.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=========================================================    ================ =
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.48(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   120.00
 UPSTREAM ELEVATION(FEET) =    581.60
 DOWNSTREAM ELEVATION(FEET) =    579.50
 ELEVATION DIFFERENCE(FEET) =     2.10
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.479
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.759
 SUBAREA RUNOFF(CFS)        0.31
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.31

****************************************************************************
 FLOW PROCESS FROM NODE   1010.00 TO NODE   1009.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
=======  ========================================; ;=  ======================
 UPSTREAM ELEVATION(FEET) =  579.50  DOWNSTREAM ELEVATION(FEET)    556.90
 STREET LENGTH(FEET) =   835.90   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) =  16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0100
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         4.38
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.23
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      1.07
 STREET FLOW TRAVEL TIME(MIN.) =   4.29   Tc(MIN.) =  11.77
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.382
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS)      8.05
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 TOTAL AREA(ACRES) =      3.50        PEAK FLOW RATE(CFS)         8.36

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) =  0.40   HALFSTREET FLOOD WIDTH(FEET)    14.58
 FLOW VELOCITY(FEET/SEC.) =  3.78   DEPTH*VELOCITY(FT*FT/SEC.)     1.50
 LONGEST FLOWPATH FROM NODE   1011.00 TO NODE   1009.00 =   955.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1010.00 TO NODE   1009.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=== ================================  ======== ======== ===================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)    11.77
 RAINFALL INTENSITY(INCH/HR) =   3.38
 TOTAL STREAM AREA(ACRES) =     3.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.36

****************************************************************************
 FLOW PROCESS FROM NODE   1013.00 TO NODE   1012.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.22(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   115.37
 UPSTREAM ELEVATION(FEET) =    571.80
 DOWNSTREAM ELEVATION(FEET) =    568.72
 ELEVATION DIFFERENCE(FEET) =      3.08
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.220
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.868
 SUBAREA RUNOFF(CFS)        0.32
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
 FLOW PROCESS FROM NODE   1012.00 TO NODE   1009.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
====' ;============================ ===================================
 UPSTREAM ELEVATION(FEET) =  568.72  DOWNSTREAM ELEVATION(FEET)    556.90
 STREET LENGTH(FEET) =   550.60   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.80
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    8.14
   AVERAGE FLOW VELOCITY(FEET/SEC.)      2.41
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.65
 STREET FLOW TRAVEL TIME(MIN.) =   3.80   Tc(MIN.)    11.02
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.516
  *USER SPECIFIED(SUBAREA):
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  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =  0
  SUBAREA AREA(ACRES)      1.20     SUBAREA RUNOFF(CFS)      2.95
  TOTAL AREA(ACRES) =      1.30       PEAK FLOW RATE(CFS)         3.27

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET)    10.46
  FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY( FT*FT/SEC.)  =   0.87
  LONGEST FLOWPATH FROM NODE   1013.00 TO NODE   1009.00 =   665.97 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1009.00 TO NODE   1009.00 IS CODE =   1

  >>>>>DESIGNATE  INDEPENDENT STREAM  FOR CONFLUENCE< <<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES< <<<<
=====;=============== ================== ==-=============== ============
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.02
  RAINFALL  INTENSITY(INCH/HR) =   3.52
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.27

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1        8.36    11.77        3.382          3.50
      2        3.27    11.02        3.516          1.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
      1       11.31     11.02       3.516
      2       11.50     11.77       3.382

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)       11.50   Tc(MIN.) =   11.77
  TOTAL AREA(ACRES) =     4.80
  LONGEST FLOWPATH FROM NODE   1011.00 TO NODE   1009.00     955.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1009.00 TO NODE   1005.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========;=========================   ===================================
  ELEVATION DATA: UPSTREAM(FEET) =   547.90  DOWNSTREAM(FEET)      547.50
  FLOW LENGTH(FEET) =    22.00   MANNING'S  N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     8.55
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     11.50
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   11.81
  LONGEST FLOWPATH FROM NODE   1011.00 TO NODE   1005.00     977.90 FEET.

****************************************************************************
  FLOW  PROCESS  FROM NODE   1005.00  TO  NODE   1005.00 IS CODE =  11

  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY< <<<<
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  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1       11.50    11.81        3.374         4.80
```

```
 LONGEST FLOWPATH FROM NODE   1011.00 TO NODE   1005.00     977.90 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF    Tc        INTENSITY      AREA
 NUMBER        (CFS)   (MIN.)    (INCH/HOUR)    (ACRE)
     1         9.79    12.52        3.247         4.10
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1005.00    1213.60 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc      INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1       20.93       11.81         3.374
     2       20.86       12.52         3.247

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        20.93   Tc(MIN.) =   11.Bl
 TOTAL AREA(ACRES)  =        8.90

****************************************************************************
 FLOW PROCESS FROM NODE   1005.00 TO NODE   1005.00 IS CODE =  12

 >>>>>CLEAR MEMORY BANK # 1 <<<<<
==============================  ====================  ======================

****************************************************************************
 FLOW PROCESS FROM NODE   1005.00 TO NODE   1014.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================== ================;= ======== =====  ==============
 ELEVATION DATA: UPSTREAM(FEET)  =   547.00  DOWNSTREAM(FEET)      545.10
 FLOW LENGTH(FEET) =   188.BO   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.l INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.)     7.Bl
 ESTIMATED  PIPE  DIAMETER(INCH)  =  24.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =      20.93
 PIPE TRAVEL  TIME(MIN. ) =   0.40    Tc(MIN.) =  12.21
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1014.00    1402.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)     12.21
 RAINFALL  INTENSITY(INCH/HR)  = · 3.30
 TOTAL  STREAM  AREA(ACRES)  =      8.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.93

****************************************************************************
 FLOW  PROCESS  FROM NODE   1016.00  TO NODE   1015.00 IS CODE =  21

 >>>>>RATIONAL  METHOD  INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER  (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.40(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) ; 116.30
 UPSTREAM ELEVATION(FEET) =    557.90
 DOWNSTREAM ELEVATION(FEET) =    555.70
 ELEVATION DIFFERENCE(FEET) =      2.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.401
   50 YEAR  RAINFALL  INTENSITY(INCH/HOUR)    4.791
 SUBAREA RUNOFF(CFS)  =      0.86
```

```
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.86

****************************************************************************
 FLOW PROCESS FROM NODE   1015.00 TO NODE   1014.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPSIZE  (NON-PRESSURE  FLOW)<<<<<
========== ================== ================ ============================
 ELEVATION  DATA: UPSTREAM(FEET) =   545.70  DOWNSTREAM(FEET)      545.60
 FLOW LENGTH(FEET) =     6.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     4.08
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      0.86
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.} =   7.43
 LONGEST FLOWPATH FROM NODE   1016.00 TO NODE   1014.00     122.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =   1

 >>>>>DESIGNATE  INDEPENDENT STREAM  FOR CONFLUENCE<<<<<
 >>>>>AND  COMPUTE  VARIOUS  CONFLUENCED STREAM VALUES<<<<<
============================    ============== ======================== =====
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)     7.43
 RAINFALL  INTENSITY(INCH/HR} =   4.78
 TOTAL STREAM AREA(ACRES) =     0.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.86

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.}    (INCH/HOUR}     (ACRE)
     1       20.93     12.21        3.302           8.90
     2        0.86      7.43        4.781           0.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1       15.32      7.43        4.781
     2       21.52     12.21        3.302

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK  FLOW  RATE(CFS)       21.52   Tc(MIN.} =   12.21
 TOTAL AREA(ACRES} =     9.10
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1014.00    1402.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  10

 >>>>>MAIN-STREAM  MEMORY  COPIED ONTO  MEMORY BANK  # 2 <<<<<
=================================== ================  =  ================

****************************************************************************
 FLOW  PROCESS  FROM NODE   1019.00 TO NODE   1018.00 IS CODE =  21

 >>>>>RATIONAL  METHOD  INITIAL  SUBAREA  ANALYSIS<<<<<
========  ============================== ============== ====================
 *USER SPECIFIED(SUBAREA):
 MOBILE  HOME  DEVELOPMENT  RUNOFF  COEFFICIENT  =  .6500
 S.C.S.  CURVE  NUMBER  (AMC II) =   0
 URBAN  AREA  WATERSHED  (USED NATURAL  WATERSHED  NOMOGRAPH,  APPENDIX X-A}
 TIME  OF  CONCENTRATION  WITH  6-MIN. ADDED =   7.22(MIN.)
 INITIAL  SUBAREA  FLOW-LENGTH(FEET} =   100.00
```

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 UPSTREAM ELEVATION(FEET) =    568.60
 DOWNSTREAM ELEVATION(FEET)      566.60
 ELEVATION DIFFERENCE(FEET)        2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.221
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.867
 SUBAREA RUNOFF(CFS)        0.32
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
 FLOW PROCESS FROM NODE   1018.00 TO NODE   1017.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==================================  ===  ====  = = ==== ==== ============;===
 UPSTREAM ELEVATION(FEET) =  566.60  DOWNSTREAM ELEVATION(FEET)    555.70
 STREET LENGTH(FEET) =   455.10   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.47
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    7.28
   AVERAGE FLOW VELOCITY(FEET/SEC.)       2.38
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.60
 STREET FLOW TRAVEL TIME(MIN.) =   3.18   Tc(MIN.)     10.40
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.627
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)       0.90      SUBAREA RUNOFF(CFS)      2.29
 TOTAL AREA(ACRES) =       1.00        PEAK FLOW RATE(CFS)          2.60

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET)      9.34
 FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY(FT*FT/SEC.)       0.79
 LONGEST FLOWPATH FROM NODE   1019.00 TO NODE   1017.00 =   555.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1018.00 TO NODE   1017.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)     10.40
 RAINFALL INTENSITY(INCH/HR) =   3.63
 TOTAL STREAM AREA(ACRES) =      1.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.60

****************************************************************************
 FLOW PROCESS FROM NODE   1021.00 TO NODE   1020.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.36(MIN.)
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   109.00
 UPSTREAM ELEVATION(FEET) =     563.20
 DOWNSTREAM ELEVATION(FEET) =    561.26
 ELEVATION DIFFERENCE(FEET) =       1.94
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.365
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =   4.807
 SUBAREA RUNOFF(CFS)        0.31
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.31

****************************************************************************
 FLOW PROCESS FROM NODE   1020.00 TO NODE   1017.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==================================    ================ ====================
 UPSTREAM ELEVATION(FEET) =  561.26   DOWNSTREAM ELEVATION(FEET)    555.70
 STREET LENGTH(FEET) =   370.50    CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) =  16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.20
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH{FEET) =    7.36
   AVERAGE FLOW VELOCITY(FEET/SEC.)       1.91
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.48
 STREET FLOW TRAVEL TIME(MIN.) =   3.24   Tc(MIN.)    10.60
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.591
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER  (AMC II) =   0
 SUBAREA AREA(ACRES)       0.70      SUBAREA RUNOFF(CFS)       1.76
 TOTAL AREA(ACRES) =       0.80        PEAK FLOW RATE(CFS)         2.07

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET)     9.34
 FLOW VELOCITY(FEET/SEC.) =  2.16   DEPTH*VELOCITY(FT*FT/SEC.)     0.63
 LONGEST FLOWPATH FROM NODE   1021.00 TO NODE   1017.00 =   479.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======== ======================= ========================================  ===
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)    10.60
 RAINFALL INTENSITY(INCH/HR) =   3.59
 TOTAL STREAM AREA(ACRES) =     0.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.07

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    {ACRE)
     1        2.60    10.40        3.627          1.00
     2        2.07    10.60        3.591          0.80

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
```

```
 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        4.65     10.40     3.627
     2        4.65     10.60        3.591

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        4.65   Tc(MIN.) =    10.40
 TOTAL AREA(ACRES) =      1.80
 LONGEST FLOWPATH FROM NODE   1019.00 TO NODE   1017.00     555.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1017.00 TO NODE   1014.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
======;=====================================================================
 ELEVATION  DATA: UPSTREAM(FEET)  =    546.10  DOWNSTREAM(FEET)      545.60
 FLOW LENGTH(FEET) =     22.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
 DEPTH OF  FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)      7.46
 ESTIMATED  PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       4.65
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  10.45
 LONGEST FLOWPATH FROM NODE   1019.00 TO NODE   1014.00     577.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)   (ACRE)
     1         4.65     10.45        3.618        1.80
 LONGEST FLOWPATH FROM NODE   1019.00 TO NODE   1014.00     577.40 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)   (ACRE)
     1        21.52     12.21        3.302        9.10
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1014.00    1402.40 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1      24.29      10.45        3.618
     2      25.77      12.21        3.302

 COMPUTED CONFLUENCE  ESTIMATES  ARE  AS  FOLLOWS:
 PEAK  FLOW  RATE(CFS)        25.77   Tc(MIN.) =    12.21
 TOTAL  AREA(ACRES)  =        10.90

****************************************************************************
 FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  12

 >>>>>CLEAR MEMORY  BANK  # 2 <<<<<
=======;======================================================================

 ****************************************************************************
 FLOW PROCESS FROM NODE   1014.00 TO NODE   1022.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
========================= ==== === ================== ======================
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```
  ELEVATION DATA: UPSTREAM(FEET) =   544.60  DOWNSTREAM(FEET)  =   543.50
  FLOW LENGTH(FEET) =   115.00   MANNING'S N   0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC. )        8.17
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =     25.77
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =  12.45
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1022.00    1517.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1023.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
==========  ================  ========  ===========  =========  ==============  ======
  ELEVATION  DATA: UPSTREAM(FEET) =   543.10  DOWNSTREAM(FEET)      541.60
  FLOW LENGTH(FEET) =   194.20   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        7.40
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =     25.77
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  12.89
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1023.00    1711.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1023.00 TO NODE   1024.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
===  =======  ================  ========  ====  ==============  ================  ====
  ELEVATION  DATA: UPSTREAM(FEET) =   541.20  DOWNSTREAM(FEET)      538.30
  FLOW LENGTH(FEET) =   297.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        8.24
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =     25.77
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =  13.49
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1024.00    2009.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1025.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   538.00  DOWNSTREAM(FEET)  =   526.50
  FLOW LENGTH(FEET) =   309.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     13.62
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =     25.77
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =  13.87
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00    2318.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  10

  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================= = ===== ===== === ==========

****************************************************************************
  FLOW PROCESS FROM NODE   1029.00 TO NODE   1028.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
%=========================================================    ======== =====
  *USER SPECIFIED(SUBAREA) :
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER  (AMC II) =   0
```

```
 URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.82(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   146.10
 UPSTREAM ELEVATION(FEET) =    557.90
 DOWNSTREAM ELEVATION(FEET) =    555.70
 ELEVATION DIFFERENCE(FEET) =     2.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.824
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.614
 SUBAREA RUNOFF(CFS)         0.42
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)         0.42

****************************************************************************
 FLOW PROCESS FROM NODE   1028.00 TO NODE   1027.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================  ==================  ========;============
 UPSTREAM ELEVATION(FEET) =  555.70  DOWNSTREAM ELEVATION(FEET)     534.90
 STREET LENGTH(FEET) =   945.50   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)     11.00
 INSIDE STREET CROSSFALL(DECIMAL)     0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)      0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
 STREET PARKWAY CROSSFALL(DECIMAL)      0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         3.58
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =   10.80
   AVERAGE FLOW VELOCITY(FEET/SEC.)       2.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.92
 STREET FLOW TRAVEL TIME(MIN.) =   5.52   Tc(MIN.)     13.34
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.098
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =    0
 SUBAREA AREA(ACRES)       2.80      SUBAREA RUNOFF(CFS)       6.07
 TOTAL AREA(ACRES) =       2.90        PEAK FLOW RATE(CFS}         6.49

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET)     13.72
 FLOW VELOCITY(FEET/SEC.) =  3.29   DEPTH*VELOCITY(FT*FT/SEC.)      1.25
 LONGEST FLOWPATH FROM NODE   1029.00 TO NODE   1027.00 =  1091.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1027.00 TO NODE   1026.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   528.60  DOWNSTREAM(FEET)      528.00
 FLOW LENGTH(FEET) =     6.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    14.04
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =      6.49
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =  13.35
 LONGEST FLOWPATH FROM NODE   1029.00 TO NODE   1026.00    1097.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1026.00 TO NODE   1026.00 IS CODE =  10
```

```
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<

****************************************************************************
  FLOW PROCESS FROM NODE   1032.00 TO NODE   1031.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============;==== ======================== ======================= =======
  *USER SPECIFIED(SUBAREA) :
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.20(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    558.80
  DOWNSTREAM ELEVATION(FEET) =   556.70
  ELEVATION DIFFERENCE(FEET) =      2.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.198
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.877
  SUBAREA RUNOFF(CFS)        0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
  FLOW PROCESS FROM NODE   1031.00 TO NODE   1030.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
=====;======;=============================================================
  UPSTREAM ELEVATION(FEET) =  556.70  DOWNSTREAM ELEVATION(FEET)    534.90
  STREET LENGTH(FEET) =   964.40   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.68
    AVERAGE FLOW VELOCITY(FEET/SEC.)      2.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.81
  STREET FLOW TRAVEL TIME(MIN.) =   5.90   Tc(MIN.)    13.10
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.142
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)      2.20      SUBAREA RUNOFF(CFS)      4.84
  TOTAL AREA(ACRES) =      2.30        PEAK FLOW RATE(CFS)         5.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET)    12.43
  FLOW VELOCITY(FEET/SEC.) =  3.16   DEPTH*VELOCITY(FT*FT/SEC.)       1.12
  LONGEST FLOWPATH FROM NODE   1032.00 TO NODE   1030.00 =  1064.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1031.00 TO NODE   1030.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================   ========= =============
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.10
```

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 RAINFALL INTENSITY(INCH/HR) =   3.14
 TOTAL STREAM AREA(ACRES)  =     2.30
 PEAK FLOW RATE{CFS) AT CONFLUENCE =      5.15

****************************************************************************
 FLOW PROCESS FROM NODE   1034.00 TO NODE   1033.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.22(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET)  =    559.30
 DOWNSTREAM ELEVATION(FEET) =    557.30
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.221
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.867
 SUBAREA RUNOFF(CFS)        0.32
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
 FLOW PROCESS FROM NODE   1033.00 TO NODE   1030.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
 UPSTREAM ELEVATION(FEET) =  557.30  DOWNSTREAM ELEVATION(FEET)    534.90
 STREET LENGTH(FEET)  =   780.00   CURB HEIGHT(INCHES)  =  6.0
 STREET HALFWIDTH(FEET) =  16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.73
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET)       9.17
   AVERAGE FLOW VELOCITY(FEET/SEC.)       2.95
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.85
 STREET FLOW TRAVEL TIME(MIN.) =   4.41   Tc(MIN.)    11.63
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.407
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)      2.00      SUBAREA RUNOFF(CFS)      4.77
 TOTAL AREA(ACRES) =      2.10        PEAK FLOW RATE(CFS)         5.09

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET)    11.83
 FLOW VELOCITY(FEET/SEC.) =  3.42   DEPTH*VELOCITY(FT*FT/SEC.)       1.17
 LONGEST FLOWPATH FROM NODE   1034.00 TO NODE   1030.00 =   880.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1030.00 TO NODE   1030.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 TOTAL NUMBER OF STREAMS =  2
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 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)     11.63
 RAINFALL  INTENSITY(INCH/HR)  =   3.41
 TOTAL STREAM AREA(ACRES)  =     2.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE  =      5.09

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         5.15    13.10        3.142          2.30
     2         5.09    11.63        3.407          2.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
     1         9.84    11.63        3.407
     2         9.84    13.10        3.142

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      9.84   Tc(MIN.) =   13.10
 TOTAL AREA(ACRES) =      4.40
 LONGEST FLOWPATH FROM NODE   1032.00 TO NODE   1030.00 =  1064.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1030.00 TO NODE   1026.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
============================================================================;    =
 ELEVATION  DATA: UPSTREAM(FEET)  =   528.50  DOWNSTREAM(FEET)      528.00
 FLOW  LENGTH(FEET)      22.80   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     8.94
 ESTIMATED  PIPE DIAMETER(INCH)  =  18.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =      9.84
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  13.15
 LONGEST FLOWPATH FROM NODE   1032.00 TO NODE   1026.00    1087.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1026.00 TO NODE   1026.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================ ==============;==============

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER       (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1         9.84    13.15        3.134        4.40
 LONGEST FLOWPATH FROM NODE   1032.00 TO NODE   1026.00    1087.20 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER       (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1         6.49    13.35    3.097            2.90
 LONGEST  FLOWPATH FROM NODE   1029.00 TO NODE   1026.00    1097.60 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
     1      16.26      13.15        3.134
     2      16.22      13.35        3.097

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     16.26   Tc(MIN.) =   13.15
 TOTAL AREA(ACRES)  =       7.30
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1026.00 TO NODE   1026.00 IS CODE =  12

  >>>>>CLEAR MEMORY BANK # 3 <<<<<


****************************************************************************
  FLOW PROCESS FROM NODE   1026.00 TO NODE   1025.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>.>>>USING COMPUTER-ESTIMATED PIPESIZE  (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET)     527.70  DOWNSTREAM(FEET)     527.20
  FLOW LENGTH(FEET) =     52.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        7.35
  ESTIMATED PIPE DIAMETER(INCH)    24.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS)       16.26
  PIPE TRAVEL TIME(MIN.)     0.12    Tc(MIN.)    13.26
  LONGEST FLOWPATH FROM NODE   1029.00 TO NODE   1025.00    1150.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  11

  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<


  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER       (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       16.26    13.26        3.112        7.30
  LONGEST FLOWPATH FROM NODE   1029.00 TO NODE   1025.00    1150.30 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER       (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       25.77    13.87    3.004           10.90
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00    2318.10 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc       INTENSITY
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
      1      41.13      13.26        3.112
      2      41.46      13.87        3.004

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)       41.46   Tc(MIN.) =   13.87
  TOTAL AREA(ACRES)         18.20

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  12

  >>>>>CLEAR MEMORY BANK # 1 <<<<<
===========  =====================  =  =====;==;=;============  =  ========

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  10

  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
====================  ====================  =====;========  ;=;=============  ==

 ****************************************************************************
  FLOW PROCESS FROM NODE   1046.00 TO NODE   1045.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================;  =;====;=======================  ==================  ===
  *USER SPECIFIED(SUBAREA) :
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```
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
  S.C.S. CURVE NUMBER  (AMC II} =    0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =    7.4l(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    115.00
  UPSTREAM ELEVATION(FEET) =     557.80
  DOWNSTREAM ELEVATION(FEET) =    555.70
  ELEVATION DIFFERENCE( FEET} =      2.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)       7.408
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.789
  SUBAREA RUNOFF(CFS)         0.31
  TOTAL AREA(ACRES) =       0.10   TOTAL  RUNOFF(CFS)         0.31

****************************************************************************
  FLOW PROCESS FROM NODE   1045.00 TO NODE   1044.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET  TABLE  SECTION  #  2 USED)<<<<<
= ====3= ==============   =====  ============= ========================== ==
  UPSTREAM  ELEVATION(FEET)  =  555.70  DOWNSTREAM                      539.40
  ELEVATION(FEET) STREET LENGTH(FEET)  =
                          704.80   CURB  HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET}    11.00
  INSIDE STREET CROSSFALL(DECIMAL)     0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)      0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
  STREET PARKWAY CROSSFALL(DECIMAL)      0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS}          2.84
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET  FLOOD  WIDTH(FEET) =     9.68
    AVERAGE FLOW VELOCITY(FEET/SEC.)       2.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.83
  STREET FLOW TRAVEL TIME(MIN.) =   4.24   Tc(MIN.)     11.65
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.404
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .7000
  S.C.S. CURVE NUMBER  (AMC II) =    0
  SUBAREA AREA(ACRES)       2.10       SUBAREA RUNOFF(CFS)       5.00
  TOTAL AREA(ACRES) =       2.20         PEAK FLOW RATE(CFS)          5.31

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET  FLOOD  WIDTH(FEET)     12.52
  FLOW VELOCITY(FEET/SEC.) =  3.21   DEPTH*VELOCITY(FT*FT/SEC.)       1.14
  LONGEST  FLOWPATH  FROM  NODE   1046.00 TO NODE   1044.00 =   819.80  FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1044.00 TO NODE   1043.00 IS CODE =  31

  >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW}<<<<<
==================================    ========================================
  ELEVATION DATA: UPSTREAM(FEET) =   533.10  DOWNSTREAM(FEET)      532.30
  FLOW LENGTH(FEET) =     7.80   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY( FEET/SEC.)     13.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       5.31
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.} =  11.66
  LONGEST FLOWPATH FROM NODE   1046.00 TO NODE   1043.00     827.60 FEET.

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```
 FLOW PROCESS FROM NODE   1043.00 TO NODE   1043.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  11.66
 RAINFALL INTENSITY(INCH/HR) =   3.40
 TOTAL STREAM AREA(ACRES) =     2.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.31

****************************************************************************
 FLOW PROCESS FROM NODE   1049.00 TO NODE   1048.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================  ============   ================== ===========
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
 S.C.S. CURVE NUMBER  (AMC II) =   0
 URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.22(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    557.70
 DOWNSTREAM ELEVATION(FEET) =    555.70
 ELEVATION  DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.221
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.867
 SUBAREA RUNOFF(CFS)        0.32
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
 FLOW PROCESS FROM NODE   1048.00 TO NODE   1047.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
===  =  ================================   ===================================
 UPSTREAM ELEVATION(FEET) =  555.70  DOWNSTREAM ELEVATION(FEET)    539.40
 STREET LENGTH(FEET) =   686.90   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.51
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    9.17
   AVERAGE FLOW VELOCITY(FEET/SEC.)       2.71
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.78
 STREET FLOW TRAVEL TIME(MIN.) =   4.23   Tc(MIN.)    11.45
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.439
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER  (AMC II) =   0
 SUBAREA AREA(ACRES)       1.80      SUBAREA RUNOFF(CFS)      4.33
 TOTAL AREA(ACRES) =       1.90        PEAK FLOW RATE(CFS)         4.65

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET)    11.83
 FLOW VELOCITY(FEET/SEC.) =  3.13   DEPTH*VELOCITY(FT*FT/SEC.)       1.07
 LONGEST FLOWPATH FROM NODE   1049.00 TO NODE   1047.00 =   786.90 FEET.
```

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****************************************************************************
  FLOW PROCESS FROM NODE    1047.00 TO NODE    1043.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING  COMPUTER- ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
 =============================================================    ===== ========
  ELEVATION DATA: UPSTREAM(FEET) =    532.80  DOWNSTREAM(FEET)     532.30
  FLOW LENGTH(FEET) =     22.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF  FLOW  IN  18..0 INCH PIPE IS    6.9  INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      7.45
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       4.65
  PIPE TRAVEL TIME(MIN.) =    0.05    Tc(MIN.) =  11.50
  LONGEST  FLOWPATH FROM NODE    1049.00 TO NODE    1043.00     809.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    1043.00 TO NODE    1043.00 IS CODE =   1

  >>>>>DESIGNATE  INDEPENDENT STREAM  FOR  CONFLUENCE< <<<<
  >>>>>AND COMPUTE VARIOUS  CONFLUENCED  STREAM  VALUES<< <<<
=======================================   ===== ========================== ===
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)     11.50
  RAINFALL INTENSITY(INCH/HR) =    3.43
  TOTAL STREAM AREA(ACRES) =      1.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.65

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.31    11.66        3.402          2.20
      2        4.65    11.50        3.430          1.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER       (CFS)     (MIN. }    (INCH/HOUR)
      1        9.92    11.50        3.430
      2        9.93    11.66        3.402

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE (CFS)         9.93   Tc(MIN.) =   11.66
  TOTAL AREA(ACRES) =       4.10
  LONGEST  FLOWPATH FROM NODE    1046.00 TO NODE    1043.00     827.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    1043.00 TO NODE    1042.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<< <<
  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<<
====== ======= ========= = ====== ========== ======= ========== =======;;, =======
  ELEVATION DATA: UPSTREAM(FEET} =    532.00  DOWNSTREAM(FEET)      531.00
  FLOW LENGTH(FEET) =     97.80   MANNING'S  N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.5
  INCHES PIPE-FLOW VELOCITY(FEET/SEC.) 6.50
  ESTIMATED PIPE DIAMETER(INCH} =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS} =       9.93
  PIPE TRAVEL TIME(MIN.} =    0.25    Tc(MIN.} =  11.91
  LONGEST  FLOWPATH FROM NODE    1046.00 TO NODE    1042.00 =    925.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    1042 .00 TO NODE    1035.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================= ============== ====================== ======================
  ELEVATION DATA: UPSTREAM(FEET) =   530.70  DOWNSTREAM(FEET)      527.90
  FLOW LENGTH(FEET) =   156.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        8.26
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =       9.93
  PIPE TRAVEL TIME(MIN. ) =    0.32    Tc(MIN.) =  12.22
  LONGEST FLOWPATH FROM NODE   1046.00 TO NODE   1035.00    1082.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1035.00 TO NODE   1035.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============ ================= ======================== =================== ====
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     12.22
  RAINFALL INTENSITY(INCH/HR) =    3.30
  TOTAL STREAM AREA(ACRES) =     4.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.93

****************************************************************************
  FLOW PROCESS FROM NODE   1038.00 TO NODE   1037.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
====================================  ========= ====== ======================
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
  S.C.S. CURVE NUMBER  (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.20(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    542.90
  DOWNSTREAM ELEVATION(FEET) =    540.80
  ELEVATION DIFFERENCE(FEET) =      2.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.198
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.877
  SUBAREA RUNOFF(CFS)        0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
  FLOW PROCESS FROM NODE   1037.00 TO NODE   1036.00 IS CODE • 62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========== =============  ======================================  ===========
  UPSTREAM ELEVATION(FEET) =  540.80  DOWNSTREAM ELEVATION(FEET)    535.00
  STREET LENGTH(FEET) =   181.20   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =     5.90
    AVERAGE FLOW VELOCITY(FEET/SEC.)      2.49
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC. )      0.56
  STREET FLOW TRAVEL TIME(MIN.) =   1.21   Tc(MIN.)      8.41
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    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.368
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUEAREA AREA(ACRES)      0.50      SUBAREA RUNOFF(CFS)      1.53
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS)         1.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET)     7.54
  FLOW VELOCITY(FEET/SEC.) =  2.82   DEPTH*VELOCITY(FT*FT/SEC.)      0.72
  LONGEST FLOWPATH FROM NODE   1038.00 TO NODE   1036.00 =   281.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1036.00 TO NODE   1035.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========== ============ ============ ===================================
  ELEVATION DATA: UPSTREAM(FEET) =   528.50  DOWNSTREAM(FEET)     527.90
  FLOW LENGTH(FEET) =     6.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      1.85
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.42
  LONGEST FLOWPATH FROM NODE   1038.00 TO NODE   1035.00     287.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1035.00 TO NODE   1035.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================;    ==========================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)      8.42
  RAINFALL INTENSITY(INCH/HR) =   4.36
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.85

****************************************************************************
  FLOW PROCESS FROM NODE   1041.00 TO NODE   1040.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========== ========== ========== ========== ========== ========
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.20(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    563.20
  DOWNSTREAM ELEVATION(FEET) =    561.10
  ELEVATION DIFFERENCE(FEET) =      2.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)     7.198
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.877
  50AREA RUNOFF(CFS)        0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
  FLOW PROCESS FROM NODE   1040.00 TO NODE   1039.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============ ======== ==================================== ========== =====
  UPSTREAM ELEVATION(FEET) =  561.10  DOWNSTREAM ELEVATION(FEET)    535.00
  STREET LENGTH(FEET) =  1122.90   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) =  16.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         3.38
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =   0.31
   HALFSTREET FLOOD WIDTH(FEET) =   10.46
   AVERAGE FLOW VELOCITY(FEET/SEC.)      2.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.90
 STREET FLOW TRAVEL TIME(MIN.) =   6.54   Tc(MIN.)    13.74
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.027
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)      2.80      SUBAREA RUNOFF(CFS)      5.93
 TOTAL AREA(ACRES) =      2.90        PEAK FLOW RATE(CFS)         6.25

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET)    13.38
 FLOW VELOCITY(FEET/SEC.) =  3.33   DEPTH*VELOCITY(FT*FT/SEC.)      1.24
 LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1039.00 =  1222.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1039.00 TO NODE   1035.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   528.36  DOWNSTREAM(FEET)     527.90
 FLOW LENGTH(FEET) =    22.60   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     7.78
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      6.25
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  13.79
 LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1035.00    1245.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1035.00 TO NODE   1035.00 IS CODE =    1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==================== ==================================  ======== ========= ====
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.)    13.79
 RAINFALL INTENSITY(INCH/HR) =   3.02
 TOTAL STREAM AREA(ACRES) =     2.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.25

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        9.93    12.22        3.300          4.10
     2        1.85     8.42        4.363          0.60
     3        6.25    13.79        3.019          2.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.
```

```
  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       13.68     8.42       4.363
      2       17.04    12.22       3.300
      3       16.61    13.79       3.019

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS;
  PEAK FLOW RATE(CFS) =     17.04   Tc(MIN.) =   12.22
  TOTAL AREA(ACRES) =      7.60
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1035.00    1245.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1035.00 TO NODE   1025.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING  COMPUTER-ESTIMATED PIPESIZE  (NON-PRESSURE FLOW)<<<<<
==================== ================ =========;;;==========================
  ELEVATION  DATA:  UPSTREAM(FEET)  =   527.40  DOWNSTREAM(FEET)      526.70
  FLOW LENGTH(FEET) =    70.70   MANNING'S N =   0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        7.55
  ESTIMATED PIPE DIAMETER(INCH)  =  24.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =     17.04
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  12.38
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1025.00    1316.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  11

  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<


  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       17.04     12.38       3.272        7.60
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1025.00    1316.20 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       41.46     13.87       3.004       18.20
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00    2318.10 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc      INTENSITY
  NUMBER     (CFS)      (MIN.)   (INCH/HOUR)
      1      55.11       12.38        3.272
      2      57.11       13.87        3..004

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)        57.11   Tc(MIN.) =   13.87
  TOTAL AREA(ACRES) =        25.80

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  12

  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================== ========= ================== ======================  =====

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1050.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   526.20  DOWNSTREAM(FEET) =   522.30
```

```
  FLOW LENGTH(FEET) =   102.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)  16.42
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      57.11
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  13.97
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1050.00    2420.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1050.00 TO NODE   1050.00 IS CODE =  10

  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
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****************************************************************************
  FLOW PROCESS FROM NODE   1052.00 TO NODE   1051.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<< <<<
============================ ========= = ============================== ==
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
  S.C.S. CURVE NUMBER {AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.13 {MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   132.20
  UPSTREAM ELEVATION(FEET) =    536.10
  DOWNSTREAM ELEVATION(FEET) =    530.40
  ELEVATION DIFFERENCE(FEET) =      5.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.126
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.907
  SUBAREA RUNOFF(CFS)        0.44
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.44

****************************************************************************
  FLOW PROCESS FROM NODE   1051.00 TO NODE   1050.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   524.00  DOWNSTREAM(FEET)      523.30
  FLOW LENGTH(FEET) =     6.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      6.62
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      0.44
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   7.14
  LONGEST FLOWPATH FROM NODE   1052.00 TO NODE   1050.00     138.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1050.00 TO NODE   1050.00 IS CODE =  11

  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY< <<<<
============;=================================== ======  ============ ======

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1         0.44      7.14        4.900         0.10
  LONGEST FLOWPATH FROM NODE   1052.00 TO NODE   1050.00     138.50 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY      AREA
  NUMBER       {CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1        57.11    13.97        2.986        25.80
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1050.00    2420.70 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)   (INCH/HOUR)
     1       35.24        7.14        4.900
     2       57.38       13.97        2.986

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        57.38   Tc(MIN.) =    13.97
 TOTAL AREA(ACRES) =        25.90

****************************************************************************
 FLOW PROCESS FROM NODE    1050.00 TO NODE    1050.00 IS CODE =  12

 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============;====== ========== ========== ========== =;;====== =======

****************************************************************************
 FLOW PROCESS FROM NODE    1050.00 TO NODE    1050.00 IS CODE =  10

 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
====================== ==================================== ==============

****************************************************************************
 FLOW PROCESS FROM NODE    1055.00 TO NODE    1054.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========%=============================================================   ;;-==  ===
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
 S.C.S. CURVE NUMBER  (AMC II) =    0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =    6.81(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =     55.70
 UPSTREAM ELBVATION(FEET) =     535.30
 DOWNSTREAM ELEVATION(FEET) =     534.30
 ELEVATION DIFFERENCE(FEET)  =       1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)       6.811
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.039
 SUBAREA RUNOFF(CFS)         0.45
 TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)         0.45

****************************************************************************
 FLOW PROCESS FROM NODE    1054.00 TO NODE    1053.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>> (STREET TABLE SECTION #  2 USED)<<<<<
================================  ============= ==============================
 UPSTREAM ELEVATION(FEET) =  534.30  DOWNSTREAM ELEVATION(FEET)     530.50
 STREET LENGTH(FEET) =   173.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)     11.00
 INSIDE STREET CROSSFALL(DECIMAL)     0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.06
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =     6.33
   AVERAGE FLOW VELOCITY(FEET/SEC.) =     2.17
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.50
 STREET FLOW TRAVEL TIME(MIN.) =   1.33   Tc(MIN.)      8.14
```

```
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.482
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER  (AMC II) =   0
  SUBAREA AREA(ACRES)       0.30      SUBAREA RUNOFF(CFS)      1.21
  TOTAL AREA(ACRES) =       0.40        PEAK FLOW RATE(CFS)          1.66

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET)     7.79
  FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT /SEC.)     0.63
  LONGEST FLOWPATH FROM NODE   1055.00 TO NODE   1053.00 =   228.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1053.00 TO NODE   1053.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============  ========================================  ==========-======
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     8.14
  RAINFALL INTENSITY(INCH/HR) =   4.48
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.66

****************************************************************************
  FLOW PROCESS FROM NODE   1058.00 TO NODE   1057.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==== === ============== ==== === ========== ========== = ====================
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
  S.C.S. CURVE NUMBER  (AMC II) =   0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED  NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.40(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    57.50
  UPSTREAM ELEVATION(FEET) =    542.20
  DOWNSTREAM ELEVATION(FEET) =    535.50
  ELEVATION DIFFERENCE(FEET) =      6.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.405
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.210
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.34

 ****************************************************************************
  FLOW PROCESS FROM NODE   1057.00 TO NODE   1056.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   535.50  DOWNSTREAM(FEET)      533.20
  FLOW LENGTH(FEET) =   116.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     3.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      0.34
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   6.99
  LONGEST FLOWPATH FROM NODE   1058.00 TO NODE   1056.00     173.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1056.00 TO NODE   1056.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=  ========== ========== ======== ========= ============================;
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    4.965
  *USER SPECIFIED(SUBAREA):
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```
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .8000
 S.C.S. CURVE NUMBER  (AMC II) =   0
 SUBAREA AREA(ACRES) =   0.10   SUBAREA RUNOFF(CFS) =    0.40
 TOTAL AREA(ACRES)         0.20   TOTAL  RUNOFF(CFS)  =    0.74
 TC(MIN.) =    6.99

****************************************************************************
 FLOW PROCESS FROM NODE    1056.00 TO NODE    1053.00 IS CODE =   31

 >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
========== ========================================  =========  ============ =
 ELEVATION  DATA:  UPSTREAM(FEET)  =    532.20  DOWNSTREAM(FEET)      524.10
 FLOW  LENGTH(FEET)  =     40.90   MANNING'S N  =  0.013
 ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS    1.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)      9.40
 ESTIMATED PIPE DIAMETER(INCH)  =   18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS)  =       0.74
 PIPE TRAVEL TIME(MIN.)  =    0.07    Tc(MIN.)  =    7.06
 LONGEST FLOWPATH FROM NODE    1058.00 TO NODE    1053.00     214.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    1053.00 TO NODE    1053.00 IS CODE =    1

 >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE<<<<<
 >>>>>AND  COMPUTE  VARIOUS  CONFLUENCED  STREAM  VALUES<<<<<

 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)      7.06
 RAINFALL  INTENSITY(INCH/HR)  =    4.93
 TOTAL STREAM AREA(ACRES) =      0.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.74

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER        (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         1.66     8.14        4.482          0.40
     2         0.74     7.06        4.934          0.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc      INTENSITY
 NUMBER        (CFS)    (MIN.)   (INCH/HOUR)
     1         2.25     7.06       4.934
     2         2.33     8.14       4.482

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK  FLOW  RATE(CFS)         2.33   Tc(MIN.)  =     8.14
 TOTAL AREA(ACRES)  =          0.60
 LONGEST FLOWPATH FROM NODE    1055.00 TO NODE    1053.00     228.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    1053.00 TO NODE    1050.00 IS CODE =   31

 >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
========================== =  ============== ========= ========= ========= ====
 ELEVATION  DATA:  UPSTREAM(FEET)  =    523.80  DOWNSTREAM(FEET)      523.30
 FLOW LENGTH(FEET)  =     22.50    MANNING'S N  =  0.013
 ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS4.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)      6.13
 ESTIMATED PIPE DIAMETER(INCH)     18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS)  =       2.33
```

```
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   8.20
 LONGEST FLOWPATH FROM NODE   1055.00 TO NODE   1050.00     251.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1050.00 TO NODE   1050.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================     ========== ===

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF    Tc       INTENSITY      AREA
 NUMBER       (CFS)   (MIN.)   (INCH/HOUR)    (ACRE)
     1         2.33     8.20       4.456        0.60
 LONGEST FLOWPATH FROM NODE   1055.00 TO NODE   1050.00     251.20 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF    Tc       INTENSITY      AREA
 NUMBER       (CFS)   (MIN.)   (INCH/HOUR)    (ACRE)
     1        57.38    13.97       2.986       25.90
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1050.00    2420.70 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1      40.77       8.20        4.456
     2      58.94      13.97        2.986

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)       58.94   Tc(MIN.)      13.97
 TOTAL AREA(ACRES) =     26.50

****************************************************************************
 FLOW PROCESS FROM NODE   1050.00 TO NODE   1050.00 IS CODE =  12

 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================== ================ ===========================   ==

****************************************************************************
 FLOW PROCESS FROM NODE   1050.00 TO NODE   1059.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==================   =+=========================================================
 ELEVATION DATA: UPSTREAM(FEET) =   522.00  DOWNSTREAM(FEET)      518.80
 FLOW LENGTH(FEET) =   107.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        15.41
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =     58.94
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  14.09
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1059.00    2528.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1059.00 TO NODE   1060.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========;========   ==========================================================
 ELEVATION DATA: UPSTREAM(FEET) =   518.40  DOWNSTREAM(FEET)      512.80
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        15.02
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =     58.94
 PIPE TRAVEL TIME{MIN.) =   1.22    Tc(MIN.) =  14.31
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1060.00    2728.40 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE   1060.00 TO NODE   1061.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   512.40  DOWNSTREAM(FEET)      510.80
 FLOW LENGTH(FEET) =   145.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     10.61
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =     58.94
 PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =  14.54
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1061.00    2873.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1061.00 TO NODE   1061.00 IS CODE =  10

 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========  ================ ============================================  ===

****************************************************************************
 FLOW PROCESS FROM NODE   1064.00 TO NODE   1063.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=  ========= ======== ======  ;=== ======  == === =======  ================  ============
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.95(MIN. )
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    69.50
 UPSTREAM ELEVATION(FEET) =    535.60
 DOWNSTREAM ELEVATION(FEET) =    534.30
 ELEVATION DIFFERENCE(FEET) =      1.30
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.947
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.982
 SUBAREA RUNOFF(CFS)        0.45
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.45

****************************************************************************
 FLOW PROCESS FROM NODE   1063.00 TO NODE   1062.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================;   ============================================
 UPSTREAM ELEVATION(FEET) =  534.30  DOWNSTREAM ELEVATION(FEET)    519.00
 STREET LENGTH(FEET) =   516.70   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.97
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    7.88
   AVERAGE FLOW VELOCITY(FEET/SEC.)      2.79
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC. )      0.73
 STREET FLOW TRAVEL TIME(MIN.) =   3.09   Tc(MIN.) =  10.04
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.693
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
```

```
  S.C.S. CURVE NUMBER  (AMC II) =    0
  SUBAREA AREA(ACRES)       0.90      SUBAREA RUNOFF(CFS) =     2.99
  TOTAL AREA(ACRES) =       1.00        PEAK FLOW RATE(CFS)          3.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET)     10.03
  FLOW VELOCITY(FEET/SEC.) =  3.15   DEPTH*VELOCITY( FT*FT/SEC.)      0.96
  LONGEST FLOWPATH FROM NODE   1064.00 TO NODE    1062.00 =    586.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    1062.00 TO NODE    1062.00 IS CODE =    1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
== =========;================================== ============== ========== ;
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     10.04
  RAINFALL INTENSITY(INCH/HR) =    3.69
  TOTAL STREAM AREA(ACRES) =      1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.44

 ****************************************************************************
  FLOW PROCESS FROM NODE    1067.00 TO NODE    1066.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .8000
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =    6.53 (MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    125.00
  UPSTREAM ELEVATION(FEET) =     570.00
  DOWNSTREAM ELEVATION(FEET) =     535.40
  ELEVATION DIFFERENCE(FEET) =      34.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)       6.527
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.159
  SUBAREA RUNOFF(CFS)         0.41
  TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)         0.41

****************************************************************************
  FLOW PROCESS FROM NODE    1066.00 TO NODE    1065.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========    ============================================================
  ELEVATION DATA: UPSTREAM(FEET) =    535.40   DOWNSTREAM(FEET)       519.10
  FLOW LENGTH(FEBT) =    522.00    MANNING'S N =   0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS    1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      4.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00     NUMBER OF PIPES      1
  PIPE-FLOW(CFS) =      0.41
  PIPE TRAVEL TIME(MIN.) =    2.11     Tc(MIN.) =    8.64
  LONGEST FLOWPATH FROM NODE    1067.00 TO NODE    1065.00     647.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    1065.00 TO NODE    1065.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
  ================================================    ======================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.271
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .8000
  S.C.S. CURVE NUMBER  (AMC II) =    0
  SUBAREA AREA(ACRES) =     0.80   SUBAREA RUNOFF(CFS)      2.73
```

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 TOTAL AREA(ACRES)         0.90   TOTAL RUNOFF(CFS)      3.15
 TC(MIN.)      B .64

****************************************************************************
 FLOW PROCESS FROM NODE   1065.00 TO NODE   1062.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================== ============ ============== ========= ===
 ELEVATION DATA: UPSTREAM(FEET) =   516.20  DOWNSTREAM(FEET)      512.50
 FLOW LENGTH(FEET) =    26.60   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    12.81
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      3.15
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   8.68
 LONGEST FLOWPATH FROM NODE   1067.00 TO NODE   1062.00     673.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1062.00 TO NODE   1062.00 IS CODE =   1

 >>>>>DESIGNATE  INDEPENDENT STREAM  FOR CONFLUENCE< <<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======C================== ============ ============== ==================== ==
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)      8.68
 RAINFALL INTENSITY(INCH/HR) =  4.26
 TOTAL STREAM AREA(ACRES) =      0.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.15

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1        3.44     10.04         3.693          1.00
     2        3.15      8.68         4.256          0.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        6.13      8.68         4.256
     2        6.17     10.04         3.693

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        6.17   Tc(MIN.) =   10.04
 TOTAL AREA(ACRES) =     1.90
 LONGEST FLOWPATH FROM NODE   1067.00 TO NODE   1062.00     673.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1062.00 TO NODE   1061.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
======== =============== ============ ======  ============================ ======
 ELEVATION DATA: UPSTREAM(FEET) =   512.20  DOWNSTREAM(FEET)  =   511.80
 FLOW LENGTH(FEET) =     3.30   MANNING'S N    0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    14.83
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      6.17
 PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =  10.04
 LONGEST FLOWPATH FROM NODE   1067.00 TO NODE   1061.00     676.90 FEET.
```

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**************************************************************************
 FLOW PROCESS FROM NODE   1061.00 TO NODE   1061.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY< <<<<
========== ================================  ===== ==;========= =============

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         6.17     10.04       3.693         1.90
 LONGEST FLOWPATH FROM NODE   1067.00 TO NODE   1061.00     676.90 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1       58.94     14.54     2.884           26.50
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1061.00    2873.70 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)      (MIN. )   (INCH/HOUR)
    1      52.20       10.04        3.693
    2      63.76       14.54        2.884

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        63.76   Tc(MIN.) =   14.54
 TOTAL AREA(ACRES)  =      28.40

**************************************************************************
 FLOW PROCESS FROM NODE   1061.00 TO NODE   1061.00 IS CODE =  12

 >>>>>CLEAR MEMORY BANK # 1 <<<<<
==============;=;== = ================================================ ==

 k      ******************************************************************
 FLOW PROCESS FROM NODE   1061.00 TO NODE   1061.00 IS CODE =  10

 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<


**************************************************************************
 FLOW PROCESS FROM NODE   1070.00 TO NODE   1069.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.60{MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    58.30
 UPSTREAM ELEVATION(FEET) =    531.40
 DOWNSTREAM ELEVATION(FEET) =    528.90
 ELEVATION DIFFERENCE(FEET) =      2.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.601
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.128
 SUBAREA RUNOFF(CFS)        0.46
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.46

**************************************************************************
 FLOW PROCESS FROM NODE   1069.00 TO NODE   1068.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
====== ==== ============ ======-=========================================
 UPSTREAM ELEVATION(FEET) =  528.90  DOWNSTREAM ELEVATION(FEET) =  519.00
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  STREET LENGTH(FEET) =   311.50   CURB HEIGHT(INCHES)    6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    7.11
    AVERAGE FLOW VELOCITY(FEET/SEC.)      2.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.68
  STREET FLOW TRAVEL TIME(MIN.) =   1.87   Tc(MIN.)     8.48
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    4.340
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER  (AMC II) =   0
  SUBAREA AREA(ACRES)       0.60      SUBAREA RUNOFF(CFS)      2.34
  TOTAL AREA(ACRES) =       0.70        PEAK FLOW RATE(CFS)          2.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET)     9.08
  FLOW VELOCITY(FEET/SEC.) =  3.08   DEPTH*VELOCITY(FT*FT/SEC.)       0.88
  LONGEST FLOWPATH FROM NODE   1070.00 TO NODE   1068.00 =   369.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    1068.00 TO NODE    1068.00 IS CODE =    1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     8.48
  RAINFALL INTENSITY(INCH/HR) =    4.34
  TOTAL STREAM AREA(ACRES) =     0.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.81

****************************************************************************
  FLOW PROCESS FROM NODE   1073.00 TO NODE   1072.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============  ================================  ============================
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .8000
  S.C.S. CURVE NUMBER  (AMC II) =   0
  URBAN AREA WATERqHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.49(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    76.00
  UPSTREAM ELEVATION(FEET) =    537.20
  DOWNSTREAM ELEVATION(FEET) =    528.00
  ELEVATION DIFFERENCE(FEET) =      9.20
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.494
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.172
  SUBAREA RUNOFF(CFS)        0.41
  TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)        0.41

****************************************************************************
  FLOW PROCESS FROM NODE    1072.00 TO NODE    1071.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
============= ==== == ==================================================
  ELEVATION DATA: UPSTREAM(FEET) =   528.00  DOWNSTREAM(FEET)      518.90
  FLOW LENGTH(FEET) =   2S9.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      4.29
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.41
  PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =   7.SO
  LONGEST FLOWPATH FROM NODE   1073.00 TO NODE   1071.00     335.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1071.00 TO NODE   1071.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.750
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)     0.30     SUBAREA RUNOFF(CFS)      1.14
  TOTAL AREA(ACRES)    0.40      TOTAL RUNOFF( CFS) =    1.55
  TC(MIN.) =    7.50

****************************************************************************
  FLOW PROCESS FROM NODE   1071.00 TO NODE   1068.00 rs CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   516.00   DOWNSTREAM(FEET)      513.00
  FLOW LENGTH(FEET) =    17.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     11.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      1.55
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   7.53
  LONGEST FLOWPATH FROM NODE   1073.00 TO NODE   1068.00     352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1068.00 TO NODE   1068.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================    ================== =======
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)     7.53
  RAINFALL INTENSITY(INCH/HR) =   4.74
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.55

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.91     8.48        4.340          0.70
      2        1.SS     7.53        4.739          0.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
      1        4.12     7.53       4.739
      2        4.23     B.48       4.340
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE{CFS)         4.23    Tc(MIN.) =     8.48
 TOTAL AREA(ACRES) =        1.10
 LONGEST FLOWPATH FROM NODE    1070.00 TO NODE    1068.00 =    369.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    1068.00 TO NODE    1061.00 IS CODE =   31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE {NON-PRESSURE FLOW)<<<<<
=========================    ============================================
 ELEVATION DATA: UPSTREAM(FEET) =    512.70   DOWNSTREAM(FEET)      511.80
 FLOW LENGTH(FEET) =     65.30    MANNING'S N     0.013
 ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS    7.5 INCHES
 PIPE-FLOW VELOCITY{FEET/SEC.)          6.09
 ESTIMATED PIPE DIAMETER{INCH) =   18.00     NUMBER OF PIPES      1
 PIPE-FLOW(CFS) =       4.23
 PIPE TRAVEL TIME(MIN. ) =    0.18     Tc(MIN.) =    8.65
 LONGEST FLOWPATH FROM NODE    1070.00 TO NODE    1061.00     435.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    1061.00 TO NODE    1061.00 IS CODE =   11

 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER        (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         4.23      8.65      4.265            1.10
 LONGEST FLOWPATH FROM NODE    1070.00 TO NODE    1061.00     435.10 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF    Tc        INTENSITY      AREA
 NUMBER        (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1        63.76     14.54        2.884        28.40
 LONGEST FLOWPATH FROM NODE    1000.00 TO NODE    1061.00    2873.70 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER       (CFS)      (MIN. )    (INCH/HOUR)
     1       47.33        8.65         4.265
     2       66.62       14.54         2.884

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        66.62    Tc(MIN.) =    14.54
 TOTAL AREA(ACRES) =     29.50

****************************************************************************
 FLOW PROCESS FROM NODE    1061.00 TO NODE    1061.00 IS CODE =   12

 >>>>>CLEAR MEMORY BANK # 1 <<<<<
== ===== ==k=== ===========  ===========+========  =+ ==

****************************************************************************
 FLOW PROCESS FROM NODE    1061.00 TO NODE    1074.00 IS CODE =   31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
====================================  ======= ========= ==================; ==
 ELEVATION DATA: UPSTREAM(FEET) =    510.50   DOWNSTREAM(FEET)      509.80
 FLOW LENGTH(FEET) =     63.20    MANNING'S N =   0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS   26.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)         11.06
 ESTIMATED PIPE DIAMETER(INCH)     39.00     NUMBER OF PIPES      1
 PIPE-FLOW(CFS) =      66.62
```

PIPE TRAVEL TIME(MIN.) 0.10 Tc(MIN.) 14.63
LONGEST FLOWPATH FROM NODE TO NODE 1074.00 2936.90 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) 29.50 TC(MIN.) 14.63
PEAK FLOW RATE(CFS) 66.62

END OF RATIONAL METHOD ANALYSIS

SYSTEM 2000

```
 ************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* McMILLIN OTAY RANCH, VILLAGE 7                                          *
* 50-YEAR STORM EVENT TO FOR BASIN 2000                                   *
* JN-14531A   SEPT 22,2004                                                *
 ************************************************************************

  FILE NAME: 2000A.DAT
  TIME/DATE OF STUDY: 09:13 09/27/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000i  5.800
   2)  10.000;  3.700
   3)  15.000;  2.800
   4)  20.000;  2.400
   5)  25.000;  2.000
   6)  30.000;  1.800
   7)  40.000;  1.500
   8)  50.000;  1.300
   9)  60.000;  1.200
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN  TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY     (FT)    (FT)  (FT)   (FT)    (n)

  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   16.0     11.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   2007.00 TO NODE   2006.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
```

```
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A}
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =    7.22(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
  UPSTREAM ELEVATION(FEET) =     581.50
  DOWNSTREAM ELEVATION(FEET) =    579.50
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)       7.221
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =   4.867
  SUBAREA RUNOFF(CFS)         0.32
  TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)         0.32

****************************************************************************
  FLOW PROCESS FROM NODE   2006.00 TO NODE   2005.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==  =========================== ==  =========== ==============================
  UPSTREAM ELEVATION(FEET) =  579.50  DOWNSTREAM ELEVATION(FEET)     577.00
  STREET LENGTH(FEET) =   257.80   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  11.00
  INSIDE STREET CROSSFALL(DECIMAL)     0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =     8.82
    AVERAGE FLOW VELOCITY(FEET/SEC.)      1.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.47
  STREET FLOW TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =    9.77
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.798
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .7500
  S.C.S. CURVE NUMBER  (AMC II) =    0
  SUBAREA AREA(ACRES)       0.80      SUBAREA RUNOFF(CFS)       2.28
  TOTAL AREA(ACRES) =       0.90        PEAK FLOW RATE(CFS)          2.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET  FLOOD  WIDTH(FEET)     11.23
  FLOW VELOCITY(FEET/SEC.) =  1.93   DEPTH*VELOCITY(FT*FT/SEC.)      0.63
  LONGEST FLOWPATH FROM NODE   2007.00 TO NODE   2005.00 =   357.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2005.00 TO NODE   2004.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==== ================  ======= ============ ====================================
  ELEVATION  DATA: UPSTREAM(FEET) =   566.40  DOWNSTREAM(FEET)      565.90
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     6.37
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      2.59
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    9.83
  LONGEST FLOWPATH FROM NODE   2007.00 TO NODE   2004.00     379.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2004.00 TO NODE   2008.00 IS CODE =  31
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================== ===•========================== ===============
  ELEVATION DATA : UPSTREAM(FEET) =   565.60  DOWNSTREAM(FEET)      562.90
  FLOW LENGTH(FEET) =   256.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)         4.84
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       2.59
  PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =  10.71
  LONGEST FLOWPATH FROM NODE   2007.00 TO NODE   2008.00     636.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2008.00 TO NODE   2008.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================     =======
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)    10.71
  RAINFALL INTENSITY(INCH/HR) =   3.57
  TOTAL STREAM AREA(ACRES) =     0.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.59

****************************************************************************
  FLOW PROCESS FROM NODE   2011.00 TO NODE   2010.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=============== ================-============== =============== ===============
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
  S.C.S. CURVE NUMBER  (AMC II) =   0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.34(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   115.50
  UPSTREAM ELEVATION(FEET) =    581.90
  DOWNSTREAM ELEVATION(FEET) =    579.50
  ELEVATION DIFFERENCE(FEET) =      2.40
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.344
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =   4.815
  SUBAREA RUNOFF(CFS)        0.31
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.31

****************************************************************************
  FLOW PROCESS FROM NODE   2010.00 TO NODE   2009.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================== =============== ======;======== ==================
  UPSTREAM ELEVATION(FEET) =  579.50  DOWNSTREAM  ELEVATION(FEET)    574.30
  STREET LENGTH(FEET) =   605.60   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) =  16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.99
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.29
```

```
    AVERAGE  FLOW  VELOCITY( FEET/SEC.)  =     1.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.54
  STREET FLOW TRAVEL TIME(MIN.) =   5.82   Tc(MIN.)     13.16
    50 YEAR RAINFALL INTENSITY( INCH/HOUR)    3.131
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES)       1.40      SUBAREA RUNOFF(CFS)       3.29
  TOTAL AREA{ACRES) =       1.50        PEAK FLOW RATE(CFS)          3.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH{FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET)     13.12
  FLOW  VELOCITY{FEET/SEC.)  =  1.99   DEPTH*VELOCITY{FT*FT/SEC.)       0.73
  LONGEST  FLOWPATH  FROM  NODE   2011.00  TO  NODE   2009.00 =   721.10  FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2009.00 TO NODE   2008.00 IS CODE =  31

  >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  {NON-PRESSURE  FLOW)<<<<<
==================  =========  ==========================;=============  ======
  ELEVATION DATA: UPSTREAM {FEET) =   563.50  DOWNSTREAM{FEET)      562.90
  FLOW  LENGTH{FEET) =     6.30   MANNING'S  N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY{FEET/SEC.)     11.65
  ESTIMATED  PIPE  DIAMETER{INCH)  =  18.00    NUMBER  OF  PIPES     1
  PIPE-FLOW{CFS) =       3.60
  PIPE TRAVEL TIME{MIN.) =   0.01    Tc(MIN.) =  13.17
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2008.00     727.40  FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2008.00 TO NODE   2008.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================  ====================  ======  =====
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN. ) =  13.17
  RAINFALL INTENSITY(INCH/HR) =  3.13
  TOTAL STREAM AREA(ACRES) =     1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.60

****************************************************************************
  FLOW PROCESS FROM NODE   2014.00 TO NODE   2013.00 IS CODE =  21

  >>>>>RATIONAL  METHOD  INITIAL  SUBAREA  ANALYSIS< <<<<
=========================================================================     ==
  *USER SPECIFIED{SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
  S.C.S. CURVE NUMBER  (AMC  II) =    0
  URBAN AREA WATERSHED  {USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.36(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   110.00
  UPSTREAM ELEVATION(FEET) =    579.00
  DOWNSTREAM  ELEVATION(FEET)  =    577.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW{MIN.)      7.363
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.807
  SUBAREA RUNOFF{CFS)        0.31
  TOTAL AREA{ACRES) =       0.10   TOTAL  RUNOFF{CFS)        0.31

 ***************************************************************************
  FLOW PROCESS FROM NODE   2013.00 TO NODE   2012.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>> {STREET TABLE  SECTION  #  2 USED)<<<<<
====  ================================================   ==========  =============
```

```
 UPSTREAM ELEVATION(FEET) =  577.00  DOWNSTREAM ELEVATION(FEET)    574.30
 STREET LENGTH(FEET) =   272.40   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) =  16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.28
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    8.31
   AVERAGE FLOW VELOCITY(FEET/SEC.)       1.65
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.45
 STREET FLOW TRAVEL TIME(MIN.) =   2.75   Tc(MIN.)    10.12
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.679
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)      0.70      SUBAREA RUNOFF(CFS)      1.93
 TOTAL AREA(ACRES) =      0.80        PEAK FLOW RATE(CFS)         2.24

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET)    10.54
 FLOW VELOCITY(FEET/SEC.) =  1.87   DEPTH*VELOCITY(FT*FT/SEC.)     0.59
 LONGEST FLOWPATH FROM NODE   2014.00 TO NODE   2012.00 =   382.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2012.00 TO NODE   2008.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =   563.40  DOWNSTREAM(FEET)     562.90
 FLOW LENGTH(FEET) =    22.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)  6.08
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       2.24
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  10.18
 LONGEST FLOWPATH FROM NODE   2014.00 TO NODE   2008.00     404.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2008.00 TO NODE   2008.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.)     10.18
 RAINFALL INTENSITY(INCH/HR) =    3.67
 TOTAL STREAM AREA(ACRES) =      0.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.24

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        2.59    10.71        3.573          0.90
    2        3.60    13.17        3.130          1.50
    3        2.24    10.18        3.668          0.80
```

```
  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc       INTENSITY
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
      1        7.B4     10.lB        3.66B
      2        7.93     10.71        3.573
      3        7.79     13.17        3.130

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS;
  PEAK FLOW RATE(CFS)        7.93   Tc(MIN.) =    10.71
  TOTAL AREA(ACRES) =       3.20
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2008.00     727.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2008.00 TO NODE   2015.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ========================================================    ===================
  ELEVATION DATA: UPSTREAM(FEET) =   562.40  DOWNSTREAM(FEET)     557.00
  FLOW  LENGTH(FEET) =   272.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)         8.19
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       7.93
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =  11.26
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2015.00     999.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2015.00 TO NODE   2015.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================      =
  TOTAL NUMBER OF STREAMS    2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)    11.26
  RAINFALL INTENSITY(INCH/HR) =   3.47
  TOTAL STREAM AREA(ACRES) =     3.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.93

****************************************************************************
  FLOW PROCESS FROM NODE   2018.00 TO NODE   2017.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==;========================================================== ============
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =    0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.22(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    576.30
  DOWNSTREAM ELEVATION(FEET) =    574.30
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.221
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.867
  SUBAREA RUNOFF(CFS)        0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

  ************************************  ************ **********************
  FLOW PROCESS FROM NODE   2017.00 TO NODE   2016.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
=======  ========;========================================  ==========
```

```
 UPSTREAM ELEVATION(FEET) =  574.30  DOWNSTREAM ELEVATION(FEET)     569.20
 STREET LENGTH(FEET) =   276.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.20
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    7.02
   AVERAGE FLOW VELOCITY(FEET/SEC.)      2.08
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.51
 STREET FLOW TRAVEL TIME(MIN.) =   2.21   Tc(MIN.)      9.43
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.938
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)       0.60      SUBAREA RUNOFF(CFS)       1.77
 TOTAL AREA(ACRES) =       0.70        PEAK FLOW RATE(CFS)          2.09

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET)     9.00
 FLOW VELOCITY(FEET/SEC.) =  2.33   DEPTH*VELOCITY(FT*FT/SEC.)     0.66
 LONGEST FLOWPATH FROM NODE   2018.00 TO NODE   2016.00 =   376.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2016.00 TO NODE   2015.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========  ==========  ==========  ==========  ===
 ELEVATION DATA: UPSTREAM(FEET) =   557.90  DOWNSTREAM(FEET)      557.50
 FLOW LENGTH(FEET) =    22.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     5.50
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      2.09
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    9.50
 LONGEST FLOWPATH FROM NODE   2018.00 TO NODE   2015.00     398.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2015.00 TO NODE   2015.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========  ==========  ==========  ==========  ==========
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)      9.50
 RAINFALL INTENSITY(INCH/HR) =   3.91
 TOTAL STREAM AREA(ACRES) =     0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.09

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        7.93    11.26        3.473          3.20
     2        2.09     9.50        3.910          0.70

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```

```
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc      INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1         9.14      9.50        3.910
      2         9.79     11.26        3.473

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)         9.79   Tc(MIN.) =    11.26
  TOTAL AREA(ACRES) =       3.90
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2015.00     999.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2015.00 TO NODE   2101.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=============  ================================ =============  ==  ===========
  ELEVATION DATA: UPSTREAM(FEET) =   556.60  DOWNSTREAM(FEET)      549.70
  FLOW LENGTH(FEET) =   263.50   MANNING'S N =  0.013
  ESTIMATED PIPE DIA.METER(INCH} INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY( FEET/SEC.}        9.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =       9.79
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =  11.72
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2101.00    1262.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2101.00 TO NODE   2101.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     11.72
  RAINFALL INTENSITY(INCH/HR) =   3.39
  TOTAL STREAM AREA(ACRES) =     3.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.79

****************************************************************************
  FLOW PROCESS FROM NODE   2104.00 TO NODE   2103.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================+=====================================    ===========
  *USER SPECIFIED(SUBAREA):
  ROAD(DIRT) COVER RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.86(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET } =   150.00
  UPSTREAM ELEVATION(FEET) =    600.00
  DOWNSTREAM ELEVATION(FEET) =    583.00
  ELEVATION DIFFERENCE(FEET) =     17.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.856
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.021
  SUBAREA RUNOFF(CFS)        0.70
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS)        0.70

 ****************************************************************************
  FLOW PROCESS FROM NODE   2103.00 TO NODE   2102.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================   ================  ===
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```
 ELEVATION DATA: UPSTREAM(FEET) =   583.00  DOWNSTREAM(FEET)      560.50
 FLOW LENGTH(FEET) =   300.00   MANNING'S N     0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     6.63
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       0.70
 PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =    7.61
 LONGEST FLOWPATH FROM NODE   2104.00 TO NODE   2102.00     450.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2102.00 TO NODE   2102.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================  ===============;====================    ====
   SO YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.704
 *USER SPECIFIED(SUBAREA):
 ROAD(DIRT) COVER RUNOFF COEFFICIENT =  .7000
 S.C.S. CURVE NUMBER  (AMC II) =    0
 SUBAREA  AREA(ACRES)    0.70     SUBAREA  RUNOFF(CFS)      2.30
 TOTAL  AREA(ACRES)   0.90     TOTAL  RUNOFF(CFS)  =    3.01
 TC(MIN.) =   7.61

****************************************************************************
 FLOW PROCESS FROM NODE   2102.00 TO NODE   2101.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
====C= ==;==== ========== ========== ============== ====================
 ELEVATION DATA: UPSTREAM(FEET) =   557.60  DOWNSTREAM(FEET)      550.20
 FLOW LENGTH(FEET) =   116.10   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     9.60
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       3.01
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    7.81
 LONGEST FLOWPATH FROM NODE   2104.00 TO NODE   2101.00     566.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2101.00 TO NODE   2101.00 IS CODE =   1

 >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE<<<<<
 >>>>>AND  COMPUTE  VARIOUS  CONFLUENCED  STREAM  VALUES<<<<<
============================ ========== ========== ====== ============ =====
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)     7.81
 RAINFALL  INTENSITY(INCH/HR)  =   4.62
 TOTAL STREAM AREA(ACRES) =     0.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.01

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1        9.79    11.72        3.390          3.90
     2        3.01     7.81        4.619          0.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1       10.19      7.81        4.619
     2       12.00     11.72        3.390

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =     12.00   Tc(MIN.) =   11.72
  TOTAL AREA(ACRES) =      4.80
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2101.00    1262.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2101.00 TO NODE   2019.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================;    ===============
  ELEVATION DATA: UPSTREAM(FEET)  =   549.40  DOWNSTREAM(FEET)      548.90
  FLOW LENGTH(FEET) =    28.40   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY( FEET/SEC. )     B.47
  ESTIMATED PIPE DIAMETER(INCH)  =  18.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =     12.00
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  11.78
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2019.00    1291.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2019.00 TO NODE   2019.00 IS CODE =  10

  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============ ========== ======= == -===;===============================:====

****************************************************************************
  FLOW PROCESS FROM NODE   2022.00 TO NODE   2021.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<< <<
====================== === ============================;====================
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.22(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    573.80
  DOWNSTREAM ELEVATION(FEET) =    571.80
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.221
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =   4.867
  SUBAREA RUNOFF(CFS)        0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
  FLOW PROCESS FROM NODE   2021.00 TO NODE   2020.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
=======:=zs=z==========================  ============================
  UPSTREAM  ELEVATION(FEET)  =  571.80   DOWNSTREAM  ELEVATION(FEET)    557.80
  STREET  LENGTH(FEET) =   363.20    CURB HEIGHT (INCHES) =  6.0
  STREET  HALFWIDTH(FEET) =  16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.36
    STREETFLOW  MODEL  RESULTS USING  ESTIMATED  FLOW:
    STREET  FLOW  DEPTH(FEET) =  0.23
    HALFSTREET  FLOOD WIDTH(FEET) =    6.25
    AVERAGE  FLOW VELOCITY(FEET/SEC.)      2.86
```

```
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
  STREET FLOW TRAVEL TIME(MIN.) =   2.12   Tc(MIN.)     9.34
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.977
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)      0.70      SUBAREA RUNOFF(CFS) =    2.09
  TOTAL AREA(ACRES) =      0.80        PEAK FLOW RATE(CFS)         2.40

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET)     8.14
  FLOW VELOCITY(FEET/SEC.) =  3.21   DEPTH*VELOCITY(FT*FT/SEC.)     0.86
  LONGEST FLOWPATH FROM NODE   2022.00 TO NODE   2020.00 =   463.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2020.00 TO NODE   2020.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============;============================ ================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     9.34
  RAINFALL INTENSITY(INCH/HR) =   3.98
  TOTAL STREAM AREA(ACRES) =     0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.40

****************************************************************************
  FLOW PROCESS FROM NODE   2024.00 TO NODE   2023.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=========== -=;======= =============   ===  ==========================
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.30(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   104.00
  UPSTREAM ELEVATION(FEET) =    565.00
  DOWNSTREAM ELEVATION(FEET) =    563.10
  ELEVATION DIFFERENCE(FEET) =      1.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.303
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.833
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.31

****************************************************************************
  FLOW PROCESS FROM NODE   2023.00 TO NODE   2020.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========= ============;=========== =========
  UPSTREAM ELEVATION(FEET) =  563.10  DOWNSTREAM ELEVATION(FEET) =  557.80
  STREET LENGTH(FEET) =   483.80   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) =  16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)        1.73
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    9.25
```

```
    AVERAGE  FLOW  VELOCITY(FEET/SEC.)  =     1.83
    PRODUCT  OF  DEPTH&VELOCITY(FT*FT/SEC.)       0.53
  STREET FLOW TRAVEL TIME(MIN.) =   4.40   Tc(MIN.) =  11.71
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.393
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)       1.10      SUBAREA RUNOFF(CFS)      2.80
  TOTAL  AREA(ACRES)  =       1.20        PEAK FLOW RATE(CFS)          3.11

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.75
  FLOW VELOCITY(FEET/SEC.) =  2.12   DEPTH*VELOCITY(FT*FT/SEC. )     0.72
  LONGEST FLOWPATH FROM NODE   2024.00 TO NODE   2020.00 =   587.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2020.00 TO NODE   2020.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======   ===   ============================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)     11.71
  RAINFALL INTENSITY(INCH/HR) =   3.39
  TOTAL STREAM AREA(ACRES) =      1.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.11

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)   (INCH/HOUR)     (ACRE)
      1         2.40     9.34         3.977          0.80
      2         3.11    11.71         3.393          1.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1         5.06      9.34        3.977
      2         5.16     11.71        3.393

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)         5.16   Tc(MIN.) =    11.71
  TOTAL AREA(ACRES) =       2.00
  LONGEST FLOWPATH FROM NODE   2024.00 TO NODE   2020.00     587.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2020.00 TO NODE   2019.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========  ========  =====  ======  ==  ======  ========  ==
  ELEVATION DATA: UPSTREAM(FEET) =    550.00  DOWNSTREAM(FEET)     549.40
  FLOW LENGTH(FEET) =      6.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)         12.93
  ESTIMATED  PIPE  DIAMETER(INCH)  =  18.00     NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =        5.16
  PIPE TRAVEL TIME(MIN.) =    0.01    Tc(MIN.) =   11.72
  LONGEST FLOWPATH FROM NODE   2024.00 TO NODE   2019.00     594.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2019.00 TO NODE   2019.00 IS CODE =  11

  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
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  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1        5.16     11.72        3.391         2.00
  LONGEST FLOWPATH FROM NODE    2024.00 TO NODE    2019.00      594.10 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1       12.00     11.78        3.380         4.80
  LONGEST FLOWPATH FROM NODE    2011.00 TO NODE    2019.00    1291.30 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc       INTENSITY
  NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
      1       17.12      11.72        3.391
      2       17.14      11.78        3.380

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)       17.14    Tc(MIN.) =    11.78
  TOTAL AREA(ACRES) =       6.80

****************************************************************************
  FLOW PROCESS FROM NODE    2019.00 TO NODE    2019.00 IS CODE =  12

  >>>>>CLEAR MEMORY BANK # 1 <<<<<
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****************************************************************************
  FLOW PROCESS FROM NODE    2019.00 TO NODE    2019.00 IS CODE =  10

  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
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****************************************************************************
  FLOW PROCESS FROM NODE    2027.00 TO NODE    2026.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
== ======== ============================ ==================================
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =  0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.33(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    570.80
  DOWNSTREAM ELEVATION(FEET) =    569.20
  ELEVATION DIFFERENCE(FEET) =      1.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.331
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.821
  SUBAREA RUNOFF(CFS)        0.31
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.31

****************************************************************************
  FLOW PROCESS FROM NODE    2026.00 TO NODE    2025.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==========================  ========= ========== ========
  UPSTREAM  ELEVATION(FEET) =  569.20  DOWNSTREAM  ELEVATION(FEET)    557.80
  STREET LENGTH(FEET) =   319.40   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) =  16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020
```

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    6.42
    AVERAGE FLOW VELOCITY(FEET/SEC. )      2.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.64
  STREET FLOW TRAVEL TIME(MIN.) =   1.94   Tc(MIN.)      9.27
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    4.006
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER  (AMC II) =   0
  SUBAREA AREA(ACRES)       0.70      SUBAREA RUNOFF(CFS)       2.10
  TOTAL AREA(ACRES) =       0.80        PEAK FLOW RATE(CFS)          2.42

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET)      8.31
  FLOW VELOCITY(FEET/SEC.) =  3.11   DEPTH*VELOCITY(FT*FT/SEC.)      0.84
  LONGEST FLOWPATH FROM NODE   2027.00 TO NODE   2025.00 =   419.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2025.00 TO NODE   2025.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================  ========  ========== =============
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.27
  RAINFALL INTENSITY(INCH/HR) =   4.01
  TOTAL STREAM AREA(ACRES) =     0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.42

 ****************************************************************************
  FLOW PROCESS FROM NODE   2029.00 TO NODE   2028.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
== ========= ======================  ==== ========= ======== ======================
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER  (AMC II) =   0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.76(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
  UPSTREAM ELEVATION(FEET) =    563.00
  DOWNSTREAM ELEVATION(FEET) =    561.30
  ELEVATION DIFFERENCE(FEET) =      1.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.760
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.641
  SUBAREA RUNOFF(CFS)         0.30
  TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)         0.30

****************************************************************************
  FLOW PROCESS FROM NODE   2028.00 TO NODE   2025.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==================  =========  ============= ============ ================ =====
  UPSTREAM ELEVATION(FEET) =  561.30  DOWNSTREAM ELEVATION(FEET)     557.80
  STREET LENGTH(FEET) =   329.30    CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
```

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  OUTSIDE STREET CROSSFALL{DECIMAL)      0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
  STREET PARKWAY CROSSFALL{DECIMAL)      0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb- to-curb)      0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section      0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)          1.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =     8.39
    AVERAGE FLOW VELOCITY(FEET/SEC.)       1.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.47
  STREET FLOW TRAVEL TIME(MIN.) =    3.18   Tc(MIN.)     10.94
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.531
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .7500
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES)       0.80      SUBAREA RUNOFF(CFS)       2.12
  TOTAL AREA(ACRES) =       0.90        PEAK FLOW RATE(CFS)          2.42

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET)     10.71
  FLOW VELOCITY(FEET/SEC.) =  1.96   DEPTH*VELOCITY(FT *FT/SEC.)      0.63
  LONGEST FLOWPATH FROM NODE   2029.00 TO NODE   2025.00 =   459.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2025.00 TO NODE   2025.00 IS CODE =    1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
====== ======================== ========= === ==================== =============
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)     10.94
  RAINFALL INTENSITY(INCH/HR) =   3.53
  TOTAL STREAM AREA(ACRES) =      0.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.42

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1         2.42      9.27         4.006           0.80
      2         2.42     10.94         3.531           0.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1         4.55      9.27         4.006
      2         4.55     10.94         3.531

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)         4.55   Tc(MIN.) =    10.94
  TOTAL AREA(ACRES) =         1.70
  LONGEST FLOWPATH FROM NODE   2029.00 TO NODE   2025.00     459.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2025.00 TO NODE   2019.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================     ====================-===     =  =
  ELEVATION DATA: UPSTREAM(FEET) =   549.90  DOWNSTREAM(FEET)      549.40
  FLOW LENGTH(FEET) =     22.30   MANNING'S  N 0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
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 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)         7.42
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       4.55
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  10.99
 LONGEST FLOWPATH FROM NODE   2029.00 TO NODE   2019.00     481.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2019.00 TO NODE   2019.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1         4.55    10.99        3.522        1.70
 LONGEST FLOWPATH FROM NODE   2029.00 TO NODE   2019.00     481.60 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        17.14    11.78        3.380        6.80
 LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2019.00    1291.30 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
     1      21.00       10.99         3.522
     2      21.51       11.78         3.380

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     21.51    Tc(MIN.) =    11.78
 TOTAL AREA(ACRES)         8.50

****************************************************************************
 FLOW PROCESS FROM NODE   2019.00 TO NODE   2019.00 IS CODE =  12

 >>>>>CLEAR MEMORY BANK # 1 <<<<<


****************************************************************************
 FLOW PROCESS FROM NODE   2019.00 TO NODE   2030.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   548.40   DOWNSTREAM(FEET)     540.50
 FLOW LENGTH(FEET) =   262.50    MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        12.11
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      21.51
 PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   12.14
 LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2030.00    1553.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2030.00 TO NODE   2030.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================  ============================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)     12.14
 RAINFALL INTENSITY(INCH/HR) =    3.32
 TOTAL STREAM AREA(ACRES) =      8.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.51
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**************************************************************************
 FLOW PROCESS FROM NODE   2032.00 TO NODE   2031.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.22(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    565.10
 DOWNSTREAM ELEVATION(FEET) =    563.10
 ELEVATION DIFFERENCE(FEET) =     2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)     7.221
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.867
 SUBAREA RUNOFF(CFS)        0.32
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

**************************************************************************
 FLOW PROCESS FROM NODE   2031.00 TO NODE   2100.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
 UPSTREAM ELEVATION(FEET) =  563.10  DOWNSTREAM ELEVATION(FEET)    553.00
 STREET LENGTH(FEET) =   482.70   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.81
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    8.22
   AVERAGE FLOW VELOCITY(FEET/SEC.)      2.37
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.64
 STREET FLOW TRAVEL TIME(MIN.) =   3.40   Tc(MIN.) =  10.62
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.589
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)      1.10      SUBAREA RUNOFF(CFS) =    2.96
 TOTAL AREA(ACRES) =      1.20        PEAK FLOW RATE(CFS)         3.28

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET)    10.54
 FLOW VELOCITY(FEET/SEC.) =  2.74   DEPTH*VELOCITY(FT*FT/SEC.)     0.86
 LONGEST FLOWPATH FROM NODE   2032.00 TO NODE   2100.00 =   582.70 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE   2100.00 TO NODE   2030.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =   542.20  DOWNSTREAM(FEET)     541.50
 FLOW LENGTH(FEET) =     7.50   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
 PIPE-FLOW  VELOCITY(FEET/SEC.) =  11.26
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 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES      1
 PIPE-FLOW(CFS) =       3.28
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =  10.63
 LONGEST FLOWPATH FROM NODE   2032.00 TO NODE   2030.00     590.20 FEET.

'****************************************************************************
 FLOW PROCESS FROM NODE   2030.00 TO NODE   2030.00 IS CODE =    ■

 >>>>>DESIGNATE  INDEPENDENT STREAM  FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================  ======== ========= ========= ====
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)    10.63
 RAINFALL  INTENSITY(INCH/HR) =   3.59
 TOTAL STREAM AREA(ACRES) =     1.20
 PEAK FLOW  RATE(CFS) AT CONFLUENCE =      3.28

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       21.51    12.14        3.315          8.50
     2        3.28    10.63        3.587          1.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
     1       23.16    10.63       3.587
     2       24.54    12.14       3.315

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        24.54   Tc(MIN.) =   12.14
 TOTAL AREA(ACRES) =        9.70
 LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2030.00    1553.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2030.00 TO NODE   2107.00 IS CODE =  3l

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON- PRESSURE  FLOW)<<<<<
=== ========== ======= ================== ======= ====================== =======
 ELEVATION DATA: UPSTREAM(FEET)  =   540.10  DOWNSTREAM(FEET)      534.10
 FLOW LENGTH(FEET) =   206.96   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)         12.13
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =     24.54
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =  12.42
 LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2107.00    1760.76 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2107.00 TO NODE   2107.00 IS CODE =   1

 >>>>>DESIGNATE  INDEPENDENT STREAM  FOR CONFLUENCE<<<<<
==============  =; ;=======================  ================  ============
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)    12.42
 RAINFALL  INTENSITY(INCH/HR) =   3.26
 TOTAL STREAM AREA(ACRES) =     9.70
 PEAK FLOW  RATE(CFS) AT CONFLUENCE =     24.54

****************************************************************************
 FLOW PROCESS FROM NODE   2105.00 TO NODE   2106.00 IS CODE =  21
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  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=;=a-===•--=••-- ======================================== -==;==========
  *USER SPECIFIED(SUBAREA);
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =    0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   8.34(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   144.10
  UPSTREAM ELEVATION(FEET) =     547.30
  DOWNSTREAM ELEVATION(FEET) =     546.20
  ELEVATION DIFFERENCE(FEET) =       1.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)       8.344
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.395
  SUBAREA RUNOFF(CFS)         3.30
  TOTAL AREA(ACRES) =       1.00   TOTAL RUNOFF(CFS)         3.30

 ****************************************************************************
  FLOW PROCESS FROM NODE   2106.00 TO NODE   2107.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================     ===========
  ELEVATION DATA: UPSTREAM(FEET) =   540.80  DOWNSTREAM(FEET)      534.80
  FLOW LENGTH(FEET) •  398.54   MANNING'S N = 0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      5.87
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       3.30
  PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   9.48
  LONGEST FLOWPATH FROM NODE   2105.00 TO NODE   2107.00     542.64 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2107.00 TO NODE   2107.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
====================================== ============ ============== ========== =
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)      9.48
  RAINFALL INTENSITY(INCH/HR) =    3.92
  TOTAL STREAM AREA(ACRES) =      1.00
  PEAK FLOW RATE{CFS) AT CONFLUENCE =       3.30

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY      AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1       24.54     12.42         3.264          9.70
      2        3.30      9.48         3.920          1.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1       23.73      9.48        3.920
      2       27.29     12.42        3.264

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE{CFS)       27.29   Tc(MIN.) =   12.42
  TOTAL AREA(ACRES) =       10.70
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2107.00    1760.76 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2107.00 TO NODE   2033.00 IS CODE =  31
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   533.80  DOWNSTREAM(FEET)      531.10
  FLOW LENGTH(FEET) =    89.04   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     13.00
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =      27.29
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  12.54
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2033.00    1849.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2033.00 TO NODE   2033.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==================================     ==================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     12.54
  RAINFALL INTENSITY(INCH/HR) =   3.24
  TOTAL STREAM AREA(ACRES) =    10.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.29

****************************************************************************
  FLOW PROCESS FROM NODE   2036.00 TO NODE   2035.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================  ==========================  ============================
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
  S.C.S. CURVE NUMBER (AMC II) =  0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.22(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    555.20
  DOWNSTREAM ELEVATION(FEET) =    553.20
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.221
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.867
  SUBAREA RUNOFF(CFS)        0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
  FLOW PROCESS FROM NODE   2035.00 TO NODE   2034.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==========  ==========  ==================================================
  UPSTREAM ELEVATION(FEET) =  553.20  DOWNSTREAM  ELEVATION(FEET}    538.00
  STREET LENGTH(FEET) =   588.40   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         4.01
    STREETFLOW MODEL RESULTS USING ESTIMAED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.97
    AVERAGE FLOW VELOCITY(FEET/SEC.}      3.11
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.01
```

```
 STREET FLOW TRAVEL TIME(MIN.) =   3.15   Tc(MIN.)    10.37
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.633
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .7500
 S.C.S. CURVE NUMBER (AMC II) =    0
 SUBAREA AREA(ACRES)       2.70      SUBAREA RUNOFF(CFS)      7.36
 TOTAL AREA(ACRES) =       2.80        PEAK FLOW RATE(CFS)         7.67

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET)    14.24
 FLOW VELOCITY(FEET/SEC.) =  3.63   DEPTH*VELOCITY(FT*FT/SEC.)      1.41
 LONGEST FLOWPATH FROM NODE   2036.00 TO NODE   2034.00 =   688.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2034.00 TO NODE   2033.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================ ================ =%==================
 ELEVATION DATA: UPSTREAM(FEET) =   532.80  DOWNSTREAM(FEET)    532.10
 FLOW LENGTH(FEET) =     6.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)         15.28
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     7.67
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =  10.38
 LONGEST FLOWPATH FROM NODE   2036.00 TO NODE   2033.00     694.70 FEET.

**********  ************************************************************
 FLOW PROCESS FROM NODE   2033.00 TO NODE   2033.00 IS CODE =    1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 ====================== === ============================== ==================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)     10.38
 RAINFALL INTENSITY(INCH/HR) =    3.63
 TOTAL STREAM AREA(ACRES) =      2.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.67

****************************************************************************
 FLOW PROCESS FROM NODE   2039.00 TO NODE   2038.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
====;======== ========== ===== ====== ========== ========== ========= ======= ========
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
 S.C.S. CURVE NUMBER (AMC II) =    0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.33(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =     562.90
 DOWNSTREAM ELEVATION(FEET) =     561.30
 ELEVATION DIFFERENCE(FEET) =       1.60
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.331
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.821
 SUBAREA RUNOFF(CFS)        0.31
 TOTAL AREA(ACRES) :     0.10   TOTAL RUNOFF(CFS) :     0.31

****************** ******************************************   ************
 FLOW PROCESS FROM NODE   2038.00 TO NODE   2037.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============== ========;====== ======== ============ ========== ==========
 UPSTREAM ELEVATION(FEET) =  561.30  DOWNSTREAM  ELEVATION(FEET)    538.00
 STREET LENGTH(FEET) =   753.40   CURB HEIGHT(INCHES) =  6.0
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 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's  FRICTION  FACTOR  for  Streetflow  Section(curb- to-curb)     O.OlBO
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         3.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.31
   HALFSTREET FLOOD WIDTH(FEET) =   10.11
   AVERAGE FLOW VELOCITY( FEET/SEC.)      3.25
   PRODUCT OF DEPTH&VELOCITY( FT*FT/SEC.)      1.00
 STREET FLOW TRAVEL TIME(MIN.) =   3.86   Tc(MIN.)    11.19
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.485
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)       2.50      SUBAREA RUNOFF(CFS)      6.53
 TOTAL AREA(ACRES) =       2.60        PEAK  FLOW  RATE(CFS)          6.85

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET  FLOOD  WIDTH(FEET)    13.12
 FLOW VELOCITY(FEET/SEC.) =  3.79   DEPTH*VELOCITY(FT*FT/SEC.) =   1.39
 LONGEST FLOWPATH FROM NODE   2039.00 TO NODE   2037.00 =   853.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2037.00 TO NODE   2033.00 IS CODE =  31

 >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<
================================     ===========-==============================
 ELEVATION  DATA: UPSTREAM(FEET)  =   536.BO   DOWNSTREAM(FEET)      532.10
 FLOW LENGTH(FEET) =    22 .30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7  INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    18.60
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      6.85
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.21
 LONGEST FLOWPATH FROM NODE   2039.00 TO NODE   2033.00     875.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2033.00 TO NODE   2033.00 IS CODE =   1

 >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=================== ====================== ============== ====== ==============
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN. )    11.21
 RAINFALL  INTENSITY(INCH/HR) =   3.48
 TOTAL STREAM AREA(ACRES) =      2.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.85

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1       27.29    12.54        3.243         10.70
     2        7.67    10.38        3.631          2.80
     3        6.85    11.21        3.482          2.60

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.
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```
 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN. )    (INCH/HOUR)
     1        38.61     10.38        3.631
     2        39.62     11.21        3.482
     3        40.52     12.54        3.243

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        40.52   Tc(MIN.) =   12.54
 TOTAL AREA(ACRES) =        16.10
 LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2033.00    1849.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2033.00 TO NODE   2040.00 IS CODE =  31

 >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   530.80  DOWNSTREAM(FEET)      523.00
 FLOW  LENGTH(FEET) =   199.90    MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.8 INCHES
 PIPE-FLOW  VELOCITY(FEET/SEC.)        15.36
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     40.52
 PIPE TRAVEL  TIME(MIN.)  =   0.22    Tc(MIN.) =  12.75
 LONGEST FLOWPATH FROM  NODE   2011.00 TO NODE   2040.00    2049.70 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL  AREA(ACRES)           16.10  TC(MIN.) =     12.75
 PEAK FLOW RATE(CFS)          40.52
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

SYSTEM 3000

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

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY fLOOO CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2003 Advanced Engineering Software (aes)
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Ana lysis prepared by:

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San Diego, California 92110
619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY ********** k *
* McMILLIN OTAY RANCH, VILLAGE 7 *
* 50-YEAR STORM EVENT FOR BASIN 3000 *
* JN-14531A SEPT 16, 2004 *
****

FILE NAME: C:\aes2003\hydrosft\ratscx\3000a.DATfT;n:-T'llJ J ;Ji_LJUULJ
TIME/DATE OF STUDY: 07:32 11/10/2004

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT(YEAR) = 50.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18-00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE 0.90
RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
*USER SPECIFIED:
NUMBER Of [TIME,INTENSITY] DATA PAIRS = 9
1) 5.000; 5.800
2) 10.000; 3.700
3) 15.000; 2.800
4) 20.000; 2.400
5) 25.000; 2.000
6) 30_000; 1.800
7) 40.000; 1.500
8) 50.000; 1.300
9) 60.000; 1.200
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED fOR RATIONAL METHOD
CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.
(BASED ON 07/1998 ADOPTED MANUAL)
NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT}	CROWN TO STREET-CROSSFALL: CROSSFALL (FT)	IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
2	20.0	15.0	0.020/0.020/0. 020	0.50	1.50	0.0100	0.125	0.0180

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = -0.12 FEET
as (Maximum Allowable Street Flow Depth} - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

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****************************************************************************
  FLOW PROCESS FROM NODE    3000.00 TO NODE    3001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALY$IS<<<<<
=========  ==============================================  ==    ========
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
  S.C.S. CURVE NUMBER (AMC II) =    0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.79(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    129.20
  UPSTREAM ELEVATION(FEET) =     543.60
  DOWNSTREAM ELEVATION(FEET) =     542.00
  ELEVATION DIFFERENCE(FEET) =       1.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)       7.789
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.629
  SUBAREA RUNOFF(CFS)         0.35
  TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)         0.35

********************************* ************* ***************************
  FLOW PROCESS FROM NODE    3001.00 TO NODE    3002.00 IS CODE =  61

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<

  UPSTREAM ELEVATION(FEET) =  538.80  DOWNSTREAM ELEVATION(FEET)    534.00
  STREET LENGTH(FEET) =   480.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)     0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)      0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)      0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section      0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.92
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH{FEET) =   11.49
    AVERAGE FLOW VELOCITY(FEET/SEC.)      2.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.72
  STREET FLOW TRAVEL TIME(MIN.) =   3.94   Tc(MIN.)     11.73
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.389
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES)       2.00      SUBAREA RUNOFF(CFS)       5.08
  TOTAL AREA(ACRES) =       2.10        PEAK FLOW RATE(CFS)          5.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET)     14.84
  FLOW VELOCITY(FEET/SEC.) =  2.34   DEPTH*VELOCITY(FT*FT/SEC.)       0.99
  LONGEST FLOWPATH FROM NODE    3000.00 TO NODE    3002.00 =    609.20 FEET.

**************** *************    ********************************  ***W * **
  FLOW PROCESS FROM NODE    3002.00 TO NODE    3003.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
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  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<
================= ============================================================
  ELEVATION DATA: UPSTREAM( FEET) =   529.70   DOWNSTREAM( FEET)     529.50
  FLOW  LENGTH(FEET) =      8.25    MANNING'S  N =  0.013
  ESTtMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH  OF  FLOW  IN   18.0 INCH  PIPE  IS    7.4  INCHES
  PIPE-FLOW  VELOCITY {FEET/SEC. )      8.00
  ESTIMATED PIPE DIAMETER(INCH) =  18.00     NUMBER  OF  PIPES      1
  PIPE-FLOW(CFS) =        5.43
  PIPE TRAVEL TIME(MIN. ) =    0.02     Tc(MIN.) =  11.75
  LONGEST  FLOWPATH  FROM  NODE    3000.00 TO NODE    3003.00      617.45 FEET.

************* ************************************    * ** ************** ******
  FLOW PROCESS FROM NODE    3003.00 TO NODE    3003.00 IS CODE =    1

  >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE<< <<<

  TOTAL  NUMBER  OF  STREAMS  =   3
  CONFLUENCE  VALUES  USED  FOR  INDEPEN DENT  STREAM   1 ARE:
  TIME OF CONCENTRATION(MIN. )     11.75
  RAINFALL INTENSITY(INCH/HR) =    3.39
  TOTAL STREAM AREA(ACRES) =      2.10
  PEAK FLOW RATE{CFS) AT CONFLUENCE =       5.43

******   ***********************************************************************
  FLOW PROCESS FROM NODE    3006.00 TO NODE    3005.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN  AREA  WATERSHED  (USED NATURAL  WATERSHED  NOMOGRAPH,  APPENDIX  X-A)
  TIME  OF  CONCENTRATION  WITH   6-MIN. ADDED =    8.02[MIN.}
  INITIAL SUBAREA FLOW-iENGTH(FEET) =    126.80
  UPSTREAM  ELEVATION(FEET)  =     543.30
  DOWNSTREAM ELEVATION( FEET) =     542.20
  ELEVATION DIFFERENCE( FEET) =       1.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)       8.022
    50 YEAR RAIN FALL INTENSITY(INCH/HOUR) = 4.531
  SUBAREA  RUNOFF(CFS}         0.34
  TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)         0.34

***************************** ************ * *** * ******* * ********************
  FLOW  PROCESS  FROM  NODE    3005 .00 TO  NODE    3005 .00 IS CODE =  81

  >>>>>ADDITION  OF  SUBAREA  TO  MAINLINE  PEAK  FLOW<<<<<

    50  YEAR  RAINFALL  INTENSITY(INCH/HOUR)  =  4.531
  *USER SPECIFIED(SUBAREA):
  SINGLE  FAMILY  DEVELOPMENT  RUNOFF  COEFFICIENT  =  .7500
  S.C.S.  CURVE  NUMBER  (AMC II) =    0
  SUBAREA  AREA(ACRES)     3.20     SUBAREA  RUNOFF(CFS)      10.87
  TOTAL   AREA(ACRES}     3.30      TOTAL   RUNOFF(CFS)  =    11.21
  TC(MIN.) =    8.02

************************************************* ***************** *******
  FLOW PROCESS FROM NODE    3005.00 TO NODE    3045.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<
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```
 ELEVATION DATA: UPSTREAM(FEET) =    537.20  DOWNSTREAM( FEET)     531.00
 FLOW LENGTH(FEET) =    598.02   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC. )        6.95
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      11.21
 PIPE TRAVEL TIME(MIN. ) =    1.43    Tc(MIN.) =    9.46
 LONGEST FLOWPATH FROM NODE    3006.00 TO NODE    3045.00     724.82 FEET.

**************************** ****************************************  * ***
 FLOW PROCESS FROM NODE    3045.00 TO NODE    3003.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET)     529.50
 FLOW LENGTH(FEET) =    115.54   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC. )     7.33
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      11.21
 PIPE TRAVEL TIME(MIN. ) =    0.26    Tc(MIN.) =    9.72
 LONGEST FLOWPATH FROM NODE    3006.00 TO NODE    3003.00     840.36 FEET.

**************** **************************** *************** *** * ***** ** **
 FLOW PROCESS FROM NODE    3003.00 TO NODE    3003.00 IS CODE =    1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)      9.72
 RAINFALL INTENSITY(INCH/HR)  =    3.82
 TOTAL STREAM AREA(ACRES) =      3.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.21

******* ****************** ****************************************   ********
 FLOW PROCESS FROM NODE    3005.00 TO NODE    3047.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
 S.C.S. CURVE NUMBER (AMC II) =    0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =    9.0B{MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    246.20
 UPSTREAM ELEVATION( FEET) =     542.20
 DOWNSTREAM ELEVATION( FEET) =     539.50
 ELEVATION DIFFERENCE(FEET) =       2.70
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN. )       9.080
   50 YEAR RAINFALL INTENSITY( INCH/HOUR) =   4.087
 SUBAREA RUNOFF(CFS)         0.31
 TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)         0.31

**************************** ************************** ********************
 FLOW PROCESS FROM NODE    3047.00 TO NODE    3004.00 IS CODE =  61

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRO SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
```

```
 UPSTREAM ELEVATION(FEET) =   539.50  DOWNSTREAM ELEVATION(FEET)     534.00
 STREET LENGTH(FEET) =   460.80   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.12
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET} =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.28
   AVERAGE FLOW VELOCITY(FEET/SEC. )      1.73
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC. )      0.47
 STREET FLOW TRAVEL TIME(MIN.) =   4.43   Tc(MIN.)    13.51
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.068
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)      0.70      SUBAREA RUNOFF(CFS)      1.61
 TOTAL AREA(ACRES) =      0.80        PEAK FLOW RATE(CFS)          1.92

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET)     9.25
 FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.)      0.61
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3004.00 =   707.00 FEET.

****** ***************** * *** ***** * ***** *** **** ******* ********** k *  *  *** *
 FLOW PROCESS FROM NODE   3004.00 TO NODE   3003.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   529.90 DOWNSTREA.M(FEET)     529.50
 FLOW LENGTH(FEET) =    23.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     5.28
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      1.92
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  13.58
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3003.00     730.30 FEET.

******** ************** ******************************  ********** * *** k ******
 FLOW PROCESS FROM NODE   3003.00 TO NODE   3003.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========== ================================== ============================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.)     13.58
 RAINFALL INTENSITY(INCH/HR) =   3.06
 TOTAL STREAM AREA(ACRES) =     0.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.92
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 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1         5.43     11.75        3.386          2.10
     2        11.21      9.72        3.818          3.30
     3         1.92     13.58        3.055          0.80

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)
     1        17.56      9.72        3.818
     2        17.10     11.75        3.386
     3        15.79     13.58        3.055

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)       17.56   Tc(MIN.) =     9.72
 TOTAL AREA(ACRES) =       6.20
 LONGEST FLOWPATH FROM NODE   3006.00 TO NODE   3003.00     840.36 FEET.

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 FLOW PROCESS FROM NODE   3003.00 TO NODE   3007.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   529.20  DOWNSTREAM(FEET)    528.50
 FLOW LENGTH(FEET) =    62.00  MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        8.01
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     17.56
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    9.85
 LONGEST FLOWPATH FROM NODE   3006.00 TO NODE   3007.00     902.36 FEET.

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 FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  10

 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK  # 1 <<<<<


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 FLOW PROCESS FROM NODE   3014.00 TO NODE   3013.00 IS CODE =  21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=== ==========================================;=====================    ====
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH,  APPENDIX  X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   8.14(MIN.}
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   133.30
 UPSTREAM ELEVATION(FEET) =    550.00
 DOWNSTREAM ELEVATION(FEET) =    548.90
 ELEVATION DIFFERENCE(FEET) =    1.10
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      8.142
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    4.480
 SUBAREA RUNOFF(CFS) =      0.67
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 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.67

* ******** * ****** ********** ********** ************************** ******* ** *
 FLOW PROCESS FROM NODE    3013.00 TO NODE    3013.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.480
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)   1.60     SUBAREA RUNOFF(CFS)      5.38
 TOTAL AREA(ACRES)    1.80     TOTAL RUNOFF(CFS) =    6.05
 TC(MIN.) =   8.14

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 FLOW PROCESS FROM NODE    3013.00 TO NODE    3046.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   542.80  DOWNSTREAM(FEET)     530.30
 FLOW LENGTH(FEET) =   651.67   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     7.55
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      6.05
 PIPE TRAVEL TIME(MIN.) =   1.44    Tc(MIN.) =   9.58
 LONGEST FLOWPATH FROM NODE    3014.00 TO NODE    3046.00     784.97 FEET.

************* ************************************************  **************
 FLOW PROCESS FROM NODE    3046.00 TO NODE    3008.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   530.30  DOWNSTREAM(FEET)     529.20
 FLOW LENGTH(FEET) =   105.10   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        6.02
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      6.05
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   9.87
 LONGEST FLOWPATH FROM NODE    3014.00 TO NODE    3008.00     890.07 FEET.

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 FLOW PROCESS FROM NODE    3008.00 TO NODE    3008.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)     9.87
 RAINFALL INTENSITY(INCH/HR) =   3.75
 TOTAL STREAM AREA(ACRES) =     1.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.05

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 FLOW PROCESS FROM NODE    3013.00 TO NODE    3048.00 IS CODE =  21
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 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =  0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH 6-MIN. ADDED =  9.24(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  155.70
 UPSTREAM ELEVATION(FEET) =  548.90
 DOWNSTREAM ELEVATION(FEET) =  548.30
 ELEVATION DIFFERENCE(FEET) =  0.60
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)     9.237
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.020
 SUBAREA RUNOFF(CFS)      0.30
 TOTAL AREA(ACRES) =     0.10   TOTAL RUNOFF(CFS)      0.30

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 FLOW PROCESS FROM NODE   3013.00 TO NODE   3012.00 IS CODE =  61

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<

 UPSTREAM ELEVATION(FEET) =  548.90  DOWNSTREAM ELEVATION(FEET)    533.90
 STREET LENGTH(FEET) =  778.60   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)    0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)    0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)        1.48
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) = 0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.36
   AVERAGE FLOW VELOCITY(FEET/SEC.)      2.24
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.61
 STREET FLOW TRAVEL TIME(MIN.) =  5.79   Tc(MIN.)    15.03
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    2.798
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES)      1.10      SUBAREA RUNOFF(CFS)      2.31
 TOTAL AREA(ACRES) =      1.20        PEAK FLOW RATE(CFS)         2.61

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET)     9.51
 FLOW VELOCITY(FEET/SEC.) =  2.55   DEPTH*VELOCITY(FT*FT/SEC.)     0.81
 LONGEST FLOWPATH FROM NODE   3013.00 TO NODE   3012.00 =   934.30 FEET.

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 FLOW PROCESS FROM NODE   3012.00 TO NODE   3008.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
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>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM (FEET) =   529.80  DOWNSTREAM( FEET)     529.40
FLOW LENGTH(FEET) =    20.21   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS5.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.)      6.07
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
PIPE-FLOW(CFS) =      2.61
PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  15.08
LONGEST FLOWPATH FROM NODE   3013.00 TO NODE   3008.00     954.51 FEET.

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FLOW PROCESS FROM NODE    3008.00 TO NODE    3008.00 IS CODE =   1

>>>>>DESIGNATE  INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.)     15.08
RAINFALL INTENSITY(INCH/HR) =   2.79
TOTAL STREAM AREA(ACRES) =      1.20
PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.61

* ************************************************************"k      *******
FLOW PROCESS FROM NODE   3011.00 TO NODE   3010.00 IS CODE =  21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

*USER  SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
S.C.S. CURVE NUMBER (AMC II) =   0
URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
TIME OF CONCENTRATION WITH  6-MIN. ADDED =   8.42(MIN.)
INITIAL SUBAREA FLOW-LENGTH(FEET) =   113.80
UPSTREAM ELEVATION(FEET) =    542.90
DOWNSTREAM ELEVATION(FEET) =    542.40
ELEVATION DIFFERENCE(FEET) =      0.50
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      8.418
*CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
 DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.365
SUBAREA RUNOFF(CFS)        0.33
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.33

*************************   ****************************************  *****
FLOW PROCESS FROM NODE   3010.00 TO NODE   3009.00 IS CODE =  61

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
==========  ==========  ==========-==========-= =====
UPSTREAM ELEVATION(FEET) =  537.60   DOWNSTREAM ELEVATION(FEET)    533.90
STREET LENGTH(FET) =   245.10    CURB HEIGHT(!NCHES) =  6.0
STREET HALFWIDTH(FEET) = 16.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
INSIDE STREET CROSSFALL(DECIMAL)     0.020
OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
STREET PARKWAY CROSSFALL(DECIMAL)     0.020
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 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section      0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)          1.28
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) = 0.27
   HALFSTREET FLOOD WIDTH(FEET) =     7.28
   AVERAGE FLOW VELOCITY(FEET/SEC.)       1.97
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.54
 STREET FLOW TRAVEL TIME(MIN.) =   2.07   Tc(MIN.)    10.49
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.612
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)       0.70      SUBAREA RUNOFF(CFS)       1.90
 TOTAL AREA(ACRES) =       0.80        PEAK FLOW RATE(CFS)          2.22

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET)      9.43
 FLOW VELOCITY(FEET/SEC.) =  2.21   DEPTH*VELOCITY(FT*FT/SEC.)     0.70
 LONGEST FLOWPATH FROM NODE   3011.00 TO NODE   3009.00 =   358.90 FEET.

**********************************  ******************************  ****** ****
 FLOW PROCESS FROM NODE   3009.00 TO NODE   3008.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   529.60  DOWNSTREAM(FEET)     529.40
 FLOW LENGTH(FEET) =    11.07   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS5.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)      5.61
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      2.22
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  10.52
 LONGEST FLOWPATH FROM NODE   3011.00 TO NODE   3008.00     369.97 FEET.

**************************  * ******* ***************************************
 FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
==============  ========================    =============== ==  === ==== =
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED  OR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION (MIN.)     10.52
 RAINFALL INTENSITY(INCH/HR) =   3.61
 TOTAL STREAM AREA(ACRES) =     0.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.22

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        6.05     9.87        3.754         1.80
     2        2.61    lS.08        2.793         1.20
     3        2.22    10.52        3.606         0.80

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.
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 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1       10.13      9.87       3.754
     2       10.06     10.52       3.606
     3        8.83     15.08       2.793

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        10.13   Tc(MIN.) =     9.87
 TOTAL AREA(ACRES) =        3.80
 LONGEST FLOWPATH FROM NODE   3013.00 TO NODE   3008.00     954.51 FEET.

****************************************************************     *******
 FLOW PROCESS FROM NODE   3008.00 TO NODE   3007.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM( FEET) =    529.90  DOWNSTREAM( FEET)     528.50
 FLOW LENGTH( FEET) =     50.93   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC. )        9.83
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      10.13
 PIPE TRAVEL TIME(MIN. ) =   0.09    Tc(MIN.) =    9.96
 LONGEST FLOWPATH FROM NODE   3013.00 TO NODE   3007.00     1005.44 FEET.

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 FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<«««


 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1       10.13      9.96        3.718         3.80
 LONGEST FLOWPATH FROM NODE   3013.00 TO NODE3007.00        1005.44 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1       17.56      9.85    3.764             6.20
 LONGEST FLOWPATH FROM NODE   3006.00 TO NODE   3007.00     902.36 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1       27.57       9.85        3.764
     2       27.47       9.96        3.718

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        27.57   Tc(MIN. ) =     9.85
 TOTAL AREA(ACRES) =      10.00

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 FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  12

 >>>>>CLEAR MEMORY BANK # 1 <<<<<
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  FLOW PROCESS FROM NODE   3007.00 TO NODE   3015.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM( FEET) =   528.50  DOWNSTREAM( FEET)     525.00
  FLOW LENGTH( FEET) =   116.95   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY( FEET/SEC.)        12.96
  ESTIMATED PIPE DIAMETER( INCH) =  24.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     27.57
  PIPE TRAVEL TIME(MIN. ) =   0.15    Tc(MIN. )=  10.00
  LONGEST FLOWPATH FROM NODE   3013.00 TO NODE   3015.00    1122.39 FEET.

***************  ** ***************************  ***********************  *********
  FLOW PROCESS FROM NODE   3015.00 TO NODE   3015.00 IS CODE =  10

  >>>>>MAIN-STREAM  MEMORY COPIED ONTO MEMORY  BANK  # 1 <<<<<


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  FLOW PROCESS FROM NODE   3021.00 TO NODE   3020.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED (SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER  (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.37(MIN. )
  INITIAL SUBAREA FLOW-LENGTH( FEET) =    57.30
  UPSTREAM ELEVATION(FEET) =    542.90
  DOWNSTREAM ELEVATION( FEET) =    534.40
  ELEVATION DIFFERENCE( FEET) =      8.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN. )      6.368
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION.  EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.226
  SUBAREA RUNOFF(CFS)        0.39
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.39

**********************************     *  ************************************
  FLOW PROCESS FROM NODE   3020.00 TO NODE   3019.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========  ============================================================;
  ELEVATION DATA: UPSTREAM(FEET) =   534.40  DOWNSTREAM(FEET)     525.90
  FLOW LENGTH( FEET) =   277.30   MANNING'S N =  0.100
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY( FEET/SEC.)     0.97
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     0.39
  PIPE TRAVEL TIME(MIN.) =   4.77    Tc(MIN. ) =  11.14
  LONGEST FLOWPATH FROM NODE   3021.00 TO NODE   3019.00     334.60 FEET.

** ***********************************************************   ************
  FLOW PROCESS FROM NODE   3019.00 TO NODE   3019.00 IS CODE =  81
```

```
  >>>>>ADDITION  OF SUBAREA TO MAINLINE  PEAK  FLOW<<<<<

    50 YEAR  RAINFALL  INTENSITY(INCH/HOU R) =  3.495
  *USER  SPECI FIED(SUBAREA):
  MULTI-UNITS  DEVELOPMENT  RUNOFF  COEFFICIENT =  .7500
  S.C.S. CURVE NUMBER  (AMC II) =    0
  SUBAREA AREA(ACRES)       0.10   SUBAREA  RU NOFF(CFS)       0.26
  TOTAL AREA(ACRES)         0.20   TOTAL  RUNOFF(CfS) =     0.65
  TC(MIN.) =   11.14

******* ********************************** ***************** ********** * *******
  FLOW  PROCESS  FROM  NODE    3019.00  TO  NODE    3016.00  IS  CODE =   31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<

  ELEVATION  DATA: UPSTREAM(FEET) =    529.50  DOWNSTREAM(FEET)      526.70
  FLOW LENGTH( FEET) =     37.43   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN   18.0 INCH PIPE IS    1.9  INCHES
  PIPE-fLOW  VELOCITY(FEET/SEC.)      6.46
  ESTIMATED  PIPE  DIAMETER(INCH) =   18.00     NUMBER  OF  PIPES      1
  PIPE-FLOW(CFS) =       0.65
  PIPE TRAVEL  TIME(MIN.) =    0.10     Tc(MIN. ) =   11.23
  LONGEST  FLOWPATH  FROM  NODE    3021.00 TO  NODE    3016.00      372.03 FEET.

*****************   ************************************************************
  FLOW PROCESS FROM NODE    3016.00 TO NODE    3016.00 IS CODE =    1

  >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE<<<<<

  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE  VALUES  USED  FOR  INDEPENDENT  STREAM   1 ARE:
  TIME  OF  CONCENTRATION(MIN.)     11.23
  RAINFALL INTENSITY(INCH/HR) =    3.48
  TOTAL  STREAM  AREA(ACRES)  =      0.20
  PEAK  FLOW  RATE( CFS) AT  CONFLUENCE =       0.65

****************************************************************************
  FLOW  PROCESS  FROM  NODE    3018.00  TO  NODE    3017.00  IS  CODE =   21

  »»>RATIONAL  METHOD  INITIAL  SUBAREA  ANALYSIS<«<<
============ ==  ==========  ==================== ========================
  *USER  SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH   6-MIN. ADDED =    7.18(MIN. )
  INITIAL  SUBAREA  FLOW-LENGTH( FEET) =     77.30
  UPSTREAM  ELEVATION( FEET) =     535.30
  DOWNSTREAM  ELEVATION( FEET) =     534.30
  ELEVATION  DI FFERENCE( FEET) =       1.00
  URBAN  SUBAREA  OVERLAND  TIME  OF  FLOW(MIN.)       7.184
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.883
  SUBAREA RUNOFF(CFS)         0.37
  TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)         0.37

****************************************  ********** ****** ************** *
  FLOW  PROCESS  FROM  NODE    3017.00  TO  NODE    3016.00  IS  CODE =   61
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<

UPSTREAM ELEVATION(FEET) =  534.30  DOWNSTREAM ELEVATION( FEET)    530.30
STREET LENGTH( FEET) =   335.60   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH( FEET) = 16.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
INSIDE STREET CROSSFALL(DECIMAL)     0.020
OUTSIDE STREET CROSSFALL( DECIMAL)     0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
STREET PARKWAY CROSSFALL(DECIMAL)     0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.05
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.27
  HALFSTREET FLOOD WIDTH(FEET) =    7.02
  AVERAGE FLOW VELOCITY (FEET/SEC.)      1.72
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC. )      0.46
STREET FLOW TRAVEL TIME(MIN.) =   3.25   Tc(MIN.)    10.44
  50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.621
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
S.C.S. CURVE NUMBER  (AMC II) =   0
SUBAREA AREA(ACRES)      0.50      SUBAREA RUNOFF(CFS)      1.36
TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS)         1.72

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.30   HALFSTREET FLOOD WIDTH( FEET)     8.82
FLOW VELOCITY(FEET/SEC. ) =  1.92   DEPTH*VELOCITY(FT*FT/SEC. )     0.58
LONGEST FLOWPATH FROM NODE   3018.00 TO NODE   3016.00 =   412.90 FEET.

******* ************************************  ******************** **********
FLOW PROCESS FROM NODE   3016.00 TO NODE   3016.00 IS CODE =   1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========;==============================================   = ; = =====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME Of CONCENTRATION(MIN.)    10.44
RAINFALL INTENSITY(INCH/HR) =   3.62
TOTAL STREAM AREA(ACRES) =     0.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.72

** CONFLUENCE DATA **
STREAM      RUNOFF       Tc       INTENSITY      AREA
NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1         0.65    11.23        3.478          0.20
    2         1.72    10.44        3.621          0.60

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF       Tc       INTENSITY
NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1         2.35    10.44        3.621
```

```
      2        2.31    11.23       3.478

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)        2.35   Tc(MIN.) =   10.44
  TOTAL AREA(ACRES) =      0.80
  LONGEST FLOWPATH FROM NODE   3018.00 TO NODE   3016.00     412.90 FEET.

****************************************************************    ***************
  FLOW PROCESS FROM NODE   3016.00 TO NODE   3015.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================ ============  ============================================
  ELEVATION DATA: UPSTREAM(FEET) =   526.30  DOWNSTREAM(FEET)      525.50
  FLOW LENGTH(FEET) =    10.26   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS3.5 INCHES PIPE-
  FLOW VELOCITY(FEET/SEC. )       9.58
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       2.35
  PIPE TRAVEL TIME(MIN. ) =   0.02    Tc(MIN.) =  10.46
  LONGEST FLOWPATH FROM NODE   3018.00 TO NODE   3015.00     423.16 FEET.

******************************  *** * ***************  *** ************ ****** ****
  FLOW PROCESS FROM NODE   3015.00 TO NODE   3015.00 IS CODE =   1

  >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR CONFLUENCE<<<<<

  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     10.46
  RAINFALL INTENSITY(INCH/HR) =   3.62
  TOTAL STREAM AREA(ACRES) =     0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.35

******************** ************************  ******************************
  FLOW PROCESS FROM NODE   3023.00 TO NODE   3022.00 IS CODE =  21

  >>>>>RATIONAL  METHOD  INITIAL  SUBAREA  ANALYSIS<<<<<
================================================================================
  *USER  SPECIFIED(SUBAREA):
  SINGLE  FAMILY  DEVELOPMENT  RUNOFF  COEFFICIENT =  .7500
  S.C.S. CURVE NUMBER  (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.32(MIN. )
  INITIAL  SUBAREA  FLOW-LENGTH(FEET) =   143.20
  UPSTREAM ELEVATION( FEET) =    535.10
  DOWNSTREAM  ELEVATION(FEET) =    530.30
  ELEVATION  DIFFERENCE(FEET) =      4.80
  URBAN  SUBAREA OVERLAN D TIME OF  FLOW(MIN. )      7.320
  *CAUTION:  SUBAREA  SLOPE  EXCEEDS  COUNTY  NOMOGRAPH
   DEFINITION.  EXTRAPOLATION  OF  NOMOGRAPH  USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.826
  SUBAREA RUNOFF(CFS)        0.72
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS)        0.72

**********************************************    **************************
  FLOW  PROCESS  FROM  NODE   3022.00 TO NODE   3015.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================   ==================  =========
  ELEVATION DATA: UPSTREAM(FEET) =   526.00  DOWNSTREAM(FEET)      525.50
  FLOW LENGTH(FEET) =    22.25   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      4.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       0.72
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   7.40
  LONGEST FLOWPATH FROM NODE   3023.00 TO NODE   3015.00     165.45 FEET.

****************************************  ***************************** ******
  FLOW PROCESS FROM NODE   3015.00 TO NODE   3015.00 IS CODE =    1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)     7.40
  RAINFALL INTENSITY(INCH/HR) =   4.79
  TOTAL STREAM AREA(ACRES) =     0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.72

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)     (ACRE)
      1         2.35    10.46         3.618          0.80
      2         0.72     7.40         4.790          0.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOff       Tc       INTENSITY
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
      1        2.50     7.40        4.790
      2         2.90    10.46        3.618

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)        2.90   Tc(MIN.) =   10.46
  TOTAL AREA(ACRES) =      1.00
  LONGEST FLOWPATH FROM NODE   3018.00 TO NODE   3015.00     423.16 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3015.00 TO NODE   3015.00 IS CODE =  11

  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<


  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1         2.90    10.46         3.618         1.00
  LONGEST FLOWPATH FROM NODE   3018.00 TO NODE   3015.00     423.16 E'EET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1       27.57    10.00         3.701        10.00
  LONGEST FLOWPATH FROM NODE   3013.00 TO NODE   3015.00    1122.39 FEET.
```

```
** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc       INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1      30.40     10.00        3.701
    2      29.85     10.46        3.618

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS)       30.40   Tc(MIN.) =   10.00
TOTAL AREA(ACRES) =     11.00

********************   ****************************************************
FLOW PROCESS FROM NODE   3015.00 TO NODE   3024.00 IS CODE =  31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) =   524.70  DOWNSTREAM(FEET)     523.70
FLOW LENGTH(FEET) =    97.23   MANNING'S N =  0.013
DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.)     8.88
ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES     1
PIPE-FLOW(CFS) =    30.40
PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =  10.18
LONGEST FLOWPATH FROM NODE   3013.00 TO NODE   3024.00    1219.62 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES)          11.1   TC(MIN.) =     10.18
PEAK FLOW RATE(CFS)        30.40


END OF RATIONAL METHOD ANALYSIS
```

SYSTEM 11000

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference:  SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. l.5A Release Date: 01/01/2003  License ID 1261

                           Analysis prepared by:

                         RICK ENGINEERING COMPANY
                             5620 Friars Road
                        San Diego, California 92110
                       619-291-0707    Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* McMILLIN OTAY RANCH, VILLAGE 7                                        *
* SO-YEAR STORM EVENT FOR BASIN 11000                                   *
* JN-14531A     SEPT 17, 2004                                           *
 ************************************************************************

  FILE NAME: C:\aes2003\hydrosft\ratscx\11000.DAT[TIrJIJCCIDOODDDIJIJ
  TIME/DATE OF STUDY: 10:05 09/22/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME, INTENSITY] DATA PAIRS =  9
   1)   5.000;  5.800
   2)  10.000;  3.700
   3)  15.000;  2.800
   4)  20.000;  2.400
   5)  25.000;  2.000
   6)  30.000;  1.800
   7)  40.000;  1.500
   8)  50.000;  1.300
   9)  60.000;  1.200
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   {BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN  TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-   / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     {FT)    SIDE / SIDE/ WAY    (FT)    {FT)  (FT)  {FT)    (n)
     -----   =======  ==  ==========:=====    ======        ======
  1   30.0      20.0     0 .018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   12.o       7.0     0 .020/0.020/0. 020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as {Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. {Depth)*(Velocity) Constraint =  6.0 {FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE  11000.00 TO NODE  11001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==================================  =========  ================  ========  ====
  *USER SPECIFIED{SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
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  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.62(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   118.40
  UPSTREAM ELEVATION(FEET) =    544.40
  DOWNSTREAM ELEVATION(FEET) =    542.80
  ELEVATION DIFFERENCE(FEET) =      1.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.617
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.701
  SUBAREA RUNOFF(CFS)        0.31
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.31

****************************************************************************
  FLOW PROCESS FROM NODE  11001.00 TO NODE  11004.00 IS CODE =  61

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
========================; ============================;  ====================
  UPSTREAM ELEVATION(FEET) =  541.50  DOWNSTREAM ELEVATION(FEET)    539.50
  STREET LENGTH(FEET) =   518.50   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 10.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)     5.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    2
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
  Manning's FRICTION FACTOR for Back-of-Walk  Flow Section     0.000

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.67
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.24
    AVERAGE FLOW VELOCITY(FEET/SEC.)       1.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.31
  STREET FLOW TRAVEL TIME(MIN.) =   8.24   Tc(MIN.)    15.86
    SO YEAR RAINFALL INTENSITY(INCH/HOUR)    2.731
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
  S.C.S. CURVE NUMBER  (AMC II) =   0
  SUBAREA AREA(ACRES)      1.10      SUBAREA RUNOFF(CFS)      2.70
  TOTAL AREA(ACRES) =      1.20        PEAK FLOW RATE(CFS)         3.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET)    10.00
  FLOW VELOCITY(FEET/SEC.) =  1.23   DEPTH*VELOCITY(FT*FT/SEC.)     0.41
  LONGEST FLOWPATH FROM NODE  11000.00 TO NODE  11004.00 =   636.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  11004.00 TO NODE  11003.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========== ================ ========= ========== ======================= ====== ====
  ELEVATION DATA: UPSTREAM(FEET) =   537.10  DOWNSTREAM(FEET)      536.50
  FLOW LENGTH(FEET) =    28.95   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      6.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      3.01
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  15.93
  LONGEST FLOWPATH FROM NODE  11000.00 TO NODE  11003.00      665.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  11003.00 TO NODE  11003.00 IS CODE =   1
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  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========  ================================= ========================== ==
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION{MIN.)     15.93
  RAINFALL INTENSITY(INCH/HR) =   2.73
  TOTAL STREAM AREA(ACRES) =     1.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.01

****************************************************************************
  FLOW PROCESS FROM NODE  11010.00 TO NODE  11011.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========== ========== ========= ============== ====== ;=====================
  *USER SPECIFIED{SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER  {AMC II) =   0
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION  (APPENDIX X-A)
  WITH  6-MIN. ADDED =   7.64{MIN.)
  INITIAL SUBAREA FLOW-LENGTH{FEET) =   105.50
  UPSTREAM ELEVATION(FEET) =    545.60
  DOWNSTREAM ELEVATION{FEET) =    544.50
  ELEVATION DIFFERENCE(FEET) =      1.10
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    4.693
  SUBAREA RUNOFF(CFS)        0.31
  TOTAL AREA{ACRES) =      0.10   TOTAL  RUNOFF(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE  11011.00 TO NODE  11002.00 IS CODE =  61

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>{STANDARD CURB SECTION USED)<<<<<
 ================== ================= ======== ============================
  UPSTREAM ELEVATION{FEET) =  544.50  DOWNSTREAM ELEVATION{FEET)    539.80
  STREET LENGTH{FEET) =   398.40   CURB HEIGHT{INCHES) =  6.0
  STREET HALFWIDTH( FEET) =  12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL{DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning' s FRICTION FACTOR for Streetflow Section{curb-to-curb)     0.0180
  Manning' s FRICTION FACTOR for Back-of -Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         0.92
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.56
    AVERAGE FLOW VELOCITY( FEET/SEC.)      1.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.43
  STREET FLOW TRAVEL TIME(MIN.) =   3.96   Tc{MIN.)    11.60
    SO  YEAR  RAINFALL  INTENSITY{INCH/HOUR)    3.412
  *USER SPECIFIED{SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER  (AMC II) =   0
  SUBAREA AREA(ACRES)       0.40      SUBAREA RUNOFF(CFS)       1.23
  TOTAL AREA(ACRES) =       0.50        PEAK FLOW RATE(CFS)          1.53

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET  FLOOD  WIDTH(FEET)      8.42
  FLOW VELOCITY(FEET/SEC.) • 1.85   DEPTH*VELOCITY(FT*FT/SEC.)      0.55
  LONGEST FLOWPATH FROM NODE  11010.00 TO NODE  11002.00 =   503.90  FEET.

****************************************************************************
  FLOW  PROCESS  FROM  NODE  11002.00  TO  NODE  11003.00 IS CODE =  31
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ELEVATION DATA: UPSTREAM(FEET) =   536.90  DOWNSTREAM(FEET)    536.50
  FLOW LENGTH(FEET) =     4.25   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     1.53
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =  11.61
  LONGEST FLOWPATH FROM NODE  11010.00 TO NODE  11003.00     508.15 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  11003.00 TO NODE  11003.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)    11.61
  RAINFALL INTENSITY(INCH/HR) =   3.41
  TOTAL STREAM AREA(ACRES) =    0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1        3.01    15.93        2.725          1.20
      2        1.53    11.61        3.411          0.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)    (INCH/HOUR)
      1        3.94    11.61        3.411
      2        4.23    15.93        2.725

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)        4.23   Tc(MIN.) =   15.93
  TOTAL AREA(ACRES) =      1.70
  LONGEST FLOWPATH FROM NODE  11000.00 TO NODE  11003.00     665.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  11003.00 TO NODE  11005.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ELEVATION DATA: UPSTREAM(FEET) =   534.70  DOWNSTREAM(FEET) =   533.80
  FLOW LENGTH(FEET) =   100.50   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     5.19
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      4.23
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   16.26
  LONGEST FLOWPATH FROM NODE  11000.00 TO NODE  11005.00     766.35 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  11005.00 TO NODE  11005.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM ·1 ARE:
  TIME OF CONCENTRATION(MIN.)     16.26
  RAINFALL  INTENSITY(INCH/HR)  =   2.70
  TOTAL STREAM AREA(ACRES) =     1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.23

****************************************************************************
  FLOW PROCESS FROM NODE  11012.00 TO NODE  11013.00 IS CODE =  21

  >>>>>RATIONAL METHOD  INITIAL SUBAREA ANALYSIS<<< <<
============================================  =======  =======  ========  ===
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT    .6500
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.86(MIN.)
  INITIAL  SUBAREA  FLOW-LENGTH(FEET) =    121.40
  UPSTREAM  ELEVATION(FEET)  =     543.10
  DOWNSTREAM  ELEVATION(FEET)  =     541.90
  ELEVATION DIFFERENCE(FEET) =       1.20
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.860
    SO YEAR RAINFALL  INTENSITY( INCH/HOUR) =  4.599
  SUBAREA RUNOFF(CFS)         0.90
  TOTAL  AREA(ACRES)  =       0.30   TOTAL RUNOFF(CFS)         0.90

****************************************************************************
  FLOW  PROCESS  FROM  NODE  11013.00  TO  NODE  11005.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
==========  ==================  ========================  ======================
  ELEVATION DATA: UPSTREAM(FEET) =   537.20  DOWNSTREAM( FEET)     534.30
  FLOW LENGTH(FEET) =     95.18   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER( INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      5.18
  ESTIMATED  PIPE DIAMETER( INCH) =  18.00    NUMBER  OF  PIPES     1
  PIPE-FLOW(CFS) =       0.90
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    8.17
  LONGEST FLOWPATH FROM NODE  11012.00 TO NODE  11005.00     216.58 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  11005.00 TO NODE  11005.00 IS CODE =   1

  >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE< <<<<
===========  ===========  ==============   ======================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)      8.17
  RAINFALL INTENSITY( INCH/HR} =   4.47
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.90

****************************************************************************
  FLOW PROCESS FROM NODE  11008.00 TO NODE  11005.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<< <<<
================================  ============  ===  ====================  ========
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   9.58(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   303.00
  UPSTREAM ELEVATION(FEET) =    544.30
  DOWNSTREAM ELEVATION(FEET)      540.90
  ELEVATION DIFFERENCE( FEET}       3.40
```

```
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN, )      9.582
   50 YEAR RAINFALL  INTENSITY(INCH/HOUR) =  3.876
 SUBAREA RUNOFF(CFS)         3.27
 TOTAL  AREA(ACRES)  =      1.30   TOTAL RUNOFF(CFS)        3.27

****************************************************************************
 FLOW PROCESS FROM NODE  11005.00 TO NODE  11005.00 IS CODE =   1

 >>>>>DESIGNATE  INDEPENDENT STREAM  FOR  CONFLUENCE<<<<<
 >>>>>AND  COMPUTE  VARIOUS  CONFLUENCED  STREAM  VALUES<<<<<
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.)     9.58
 RAINFALL INTENSITY(INCH/HR) =   3.88
 TOTAL STREAM AREA(ACRES) =     1.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.27

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        4.23    16.26        2.699          1.70
     2        0.90     8.17        4.470          0.30
     3        3.27     9.58        3.876          1.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
     1        6.29     8.17       4.470
     2        7.00     9.58       3.876
     3        7.06    16.26       2.699

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        7.06   Tc(MIN.) =   16.26
 TOTAL AREA(ACRES) =      3.30
 LONGEST FLOWPATH FROM NODE  11000.00 TO NODE  11005.00     766.35 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  11005.00 TO NODE  11006.00 IS CODE =  31

 >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =   533.50  DOWNSTREAM(FEET)     530.90
 FLOW LENGTH(FEET) =   261.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        6.11
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      7.06
 PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =  16.97
 LONGEST FLOWPATH FROM NODE  11000.00 TO NODE  11006.00    1027.85 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  11006.00 TO NODE  11007.00 IS CODE =  31

 >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   530.90  DOWNSTREAM(FEET)      518.50
 FLOW LENGTH(FEET) =    86.14   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    16.40
 ESTIMATED PIPE DIAMETER(INCH)    18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      7.06
```

```
 PIPE TRAVEL TIME(MIN.)     0.09    Tc(MIN.)     17.06
 LONGEST FLOWPATH FROM NODE    TO NODE          1100 7.00     1113.99 FEET.
============================================    ================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)             3.30  TC(MIN.)       17.06
 PEAK FLOW RATE(CFS)           7.06
======== ================   ================== ========================= ====
=========================================================================    ====
 END OF RATIONAL METHOD ANALYSIS
```

SYSTEM 12000

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. l.SA Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* McMILLIN OTAY RANCH, VILLAGE 7                                          *
* SO-YEAR STORM EVENT FOR BASIN 12000                                     *
* JN-14531A     SEPT 22, 2004                                             *
 *************************************************************************

  FILE NAME: 12000A.DAT
  TIME/DATE OF STUDY: 15:11 09/27/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF (TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  5.800
   2)  10.000;  3.700
   3)  15.000;  2.800
   4)  20.000;  2.400
   5)  25.000;  2.000
   6)  30.000;  1.800
   7)  40.000;  1.500
   8)  50.000;  1.300
   9)  60.000;  1.200
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:    CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH   CROSSFALL  IN-  / OUT-/PARK-   HEIGHT   WIDTH   LIP  HIKE   FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)     (FT)  (FT)  (FT)     (n)

  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   16.0     11.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE  12070.00 TO NODE  12069.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================== ;=========================
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
```

```
 S.C.S. CURVE NUMBER (AMC II) =    0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A}
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =    7.18(MIN.}
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
 UPSTREAM ELEVATION(FEET) =     572.70
 DOWNSTREAM ELEVATION(FEET ) =     570.50
 ELEVATION DIFFERENCE(FEET} =       2.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.} =     7.177
   50 YEAR RAINFALL INTENSITY(INCH/HOUR} = 4.886
 SUBAREA RUNOFF(CFS)         0.44
 TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)         0.44

****************************************************************************
 FLOW PROCESS FROM NODE  12069.00 TO NODE  12068.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED}<<<<<
==========================================    ====;========== ==========
 UPSTREAM ELEVATION(FEET) =  570.50  DOWNSTREAM ELEVATION(FEET}     565.00
 STREET LENGTH(FEET) =   368.00    CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)     0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)      0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
 STREET PARKWAY CROSSFALL(DECIMAL}      0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb}      0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.00
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =   0.29
   HALFSTREET FLOOD WIDTH(FEET) =     9.17
   AVERAGE  FLOW VELOCITY(FEET/SEC.}       2.16
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.}       0.62
 STREET FLOW TRAVEL TIME(MIN.) =    2.84   Tc(MIN.}     10.02
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.697
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER  (AMC II) =    0
 SUBAREA AREA(ACRES)       1.10       SUBAREA RUNOFF(CFS}       3.05
 TOTAL AREA(ACRES} =       1.20         PEAK FLOW RATE(CFS} =        3.49

 END OF SUBAREA STREET FLOW HYDRAULICS :
 DEPTH(FEET) =  0.34   HALFSTREET FLOOD WIDTH(FEET}     11.57
 FLOW VELOCITY(FEET/SEC.) =   2.45   DEPTH*VELOCITY(FT*FT/SEC.)       0.82
 LONGEST FLOWPATH FROM NODE  12070.00 TO NODE  12068.00 =    468.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12068.00 TO NODE  12062.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW}<<<<<
==========================;  ==================   ============================
 ELEVATION DATA: UPSTREAM(FEET) =   560.90  DOWNSTREAM(FEET)     559.60
 FLOW LENGTH(FEET) =     62.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)      6.73
 ESTIMATED PIPE DIAMETER(INCH) =  18.00     NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       3.49
 PIPE TRAVEL TIME{MIN.) =    0.15     Tc(MIN.) =  10.17
 LONGEST FLOWPATH FROM NODE  12070.00 TO NODE  12062.00 =    530.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12062.00 TO NODE  12062.00 IS CODE =   1
```

```
  >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR CONFLUENCE<<<<<
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     10.17
  RAINFALL  INTENSITY(INCH/HR)  =   3.67
  TOTAL STREAM AREA(ACRES)  =     1.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.49

****************************************************************************
  FLOW PROCESS FROM NODE  12065.00 TO NODE  12064.00 IS CODE =  21

  >>>>>RATIONAL  METHOD  INITIAL  SUBAREA  ANALYSIS<<<<<
  *USER SPECIFIED(SUBAREA):
  MOBILE  HOME DEVELOPMENT  RUNOFF  COEFFICIENT  =  .6500
  S.C.S. CURVE NUMBER  (AMC  II) =    0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =    7.22(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
  UPSTREAM  ELEVATION(FEET)  =     578.10
  DOWNSTREAM  ELEVATION(FEET)  =     576.10
  ELEVATION  DIFFERENCE(FEET)  =       2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =     7.221
    50 YEAR RAINFALL  INTENSITY(INCH/HOUR) =  4.867
  SUBAREA RUNOFF(CFS)         0.32
  TOTAL AREA(ACRES) =       0.10   TOTAL RUNOFF(CFS)         0.32

****************************************************************************
  FLOW PROCESS FROM NODE  12064.00 TO NODE  12063.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<

  UPSTREAM ELEVATION(FEET) =  576.10  DOWNSTREAM ELEVATION(FEET)     564.50
  STREET LENGTH(FEET) =   646.20   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)     11.00
  INSIDE STREET CROSSFALL(DECIMAL)     0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)      0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
  STREET PARKWAY CROSSFALL(DECIMAL)      0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
  Manning's FRICTION  FACTOR  for  Back-of-Walk  Flow Section      0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)          4.84
    STREETFLOW  MODEL  RESULTS  USING  ESTIMATED  FLOW:
    STREET  FLOW DEPTH(FEET)  =   0.36
    HALFSTREET FLOOD WIDTH(FEET) =    12.69
    AVERAGE FLOW VELOCITY(FEET/SEC.)       2.85
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       1.02
  STREET FLOW TRAVEL TIME(MIN.) =    3.78    Tc(MIN.)     11.00
    50  YEAR  RAINFALL  INTENSITY(INCH/HOUR)     3.520
  *USER SPECIFIED(SUBAREA):
  MOBILE  HOME DEVELOPMENT  RUNOFF  COEFFICIENT  =  .7500
  S.C.S. CURVE NUMBER  (AMC  II) =    0
  SUBAREA AREA(ACRES)       3.40       SUBAREA RUNOFF(CFS)       8.98
  TOTAL AREA(ACRES) =       3.50         PEAK FLOW RATE(CFS)          9.29

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET  FLOOD WIDTH(FEET)    16.00
  FLOW VELOCITY(FEET/SEC.)  =   3.27    DEPTH*VELOCITY(FT*FT/SEC.)       1.39
  LONGEST  FLOWPATH  FROM  NODE   12065.00 TO NODE   12063.00 =    746.20 FEET.

 ****************************************************************************
```

```
 FLOW PROCESS FROM NODE  12063.00 TO NODE  12062.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =   559.80  DOWNSTREAM(FEET)     559.60
 FLOW LENGTH(FEET) =     8.50   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
 PIPE-F'LOW VELOCITY(FEET/SEC.)     9.07
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      9.29
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.02
 LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12062.00     754.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12062.00 TO NODE  12062.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)    11.02
 RAINFALL INTENSITY(INCH/HR) =   3.52
 TOTAL STREAM AREA(ACRES) =     3.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.29

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       3.49     10.17       3.670          1.20
     2       9.29     11.02       3.517          3.50

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       12.40    10.17       3.670
     2       12.64    11.02       3.517

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)       12.64   Tc(MIN.) =   11.02
 TOTAL AREA(ACRES) =       4.70
 LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12062.00     754.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12062.00 TO NODE  12058.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =   559.10  DOWNSTREAM(FEET)     558.30
 FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)      8.93
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     12.64
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  11.09
 LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12058.00     795.70 FEET.

 k ****************************************************************************
 FLOW PROCESS FROM NODE  12056.00 TO NODE  12058.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)    11.09
 RAINFALL INTENSITY(INCH/HR) =   3.50
 TOTAL STREAM AREA(ACRES) =     4.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.64

****************************************************************************
 FLOW PROCESS FROM NODE   4000.00 TO NODE   4001.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
 S.C.S. CURVE NUMBER (AMC II) =  0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.29(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
 UPSTREAM ELEVATION(FEET) =    576.30
 DOWNSTREAM ELEVATION(FEET) =    572.50
 ELEVATION DIFFERENCE(FEET) =      3.80
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.291
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION.  EXTRAPOLATION OF NOMOGRAPH USED.
  50 YEAR RAINFALL INTENSITY(INCH/HOUR) =   4.838
 SUBAREA RUNOFF(CFS)        0.63
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS)        0.63

****************************************************************************
 FLOW PROCESS FROM NODE   4001.00 TO NODE   4002.00 IS CODE =  51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =====-====;================================ ==========================
 ELEVATION DATA: UPSTREAM(FEET) =    572.50  DOWNSTREAM(FEET)     570.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE    0.0125
 CHANNEL BASE(FEET)      2.00    "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.307
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT    .6500
 S.C.S. CURVE NUMBER (AMC II) =  0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.61
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)     2.11
 AVERAGE FLOW DEPTH(FEET)     0.29   TRAVEL TIME{MIN.)     1.26
 Tc(MIN.) =   8.56
 SUBAREA AREA(ACRES)       0.70       SUBAREA RUNOFF(CFS)      1.96
 TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =       2.59

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.)     2.42
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4002.00 =   290.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4002.00 TO NODE  12058.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=================-============  ============ ============ ============  =======
 ELEVATION DATA: UPSTREAM(FEET) =   560.90  DOWNSTREAM(FEET)     558.80
 FLOW LENGTH(FEET) =   74.40   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     6.87
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      2.59
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   8.74
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE  12058.00     364.40 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE  12058.00 TO NODE  12058.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)      8.74
  RAINFALL INTENSITY(INCH/HR) =    4.23
  TOTAL STREAM AREA(ACRES) =      0.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.59

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
      1       12.64     11.09        3.504         4.70
      2        2.59      8.74        4.231         0.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
      1       13.05      8.74       4.231
      2       14.78     11.09       3.504

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)       14.78   Tc(MIN.) =   11.09
  TOTAL AREA(ACRES) =      5.60
  LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12058.00     795.70 FEET.

 k  ****************************************************************************
  FLOW PROCESS FROM NODE  12058.00 TO NODE  12057.00 rs CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
==============================================  =========;==  ==========
  ELEVATION DATA: UPSTREAM(FEET) =    558.00  DOWNSTREAM( FEET)     554.40
  FLOW LENGTH(FEET) =   179.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     9.57
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     14.78
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =  11.40
  LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12057.00     974.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12057.00 TO NODE  12050.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
==================  =========;;=== ======  m ====================C============
  ELEVATION  DATA: UPSTREAM(FEET) =    554.10  DOWNSTREAM(FEET)     545.50
  FLOW LENGTH(FEET) =   245.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)    11.72
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     14.78
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =  11.75
  LONGEST FLOWPATH  FROM NODE  12065.00 TO NODE  12050.00    1219.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12050.00 TO NODE  12050.00 IS CODE =   1

  >>>>>DESIGNATE  INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

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==========  =  ===;=========  ========  ========  ========
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.75
  RAINFALL  INTENSITY(INCH/HR)  =   3.38
  TOTAL STREAM AREA(ACRES)  =     5.60
  PEAK FLOW RATE(CFS} AT CONFLUENCE =     14.78

****************************************************************************
  FLOW PROCESS FROM NODE  12053.00 TO NODE  12052.00 IS CODE =  21

  >>>>>RATIONAL  METHOD  INITIAL SUBAREA  ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A}
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.22(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET)  =    568.60
  DOWNSTREAM ELEVATION(FEET)  =    566.60
  ELEVATION DIFFERENCE(FEET)  =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.221
    50 YEAR  RAINFALL  INTENSITY(INCH/HOUR)  =  4.867
  SUBAREA RUNOFF(CFS)        0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL  RUNOFF(CFS}        0.32

****************************************************     ************
  FLOW PROCESS FROM NODE  12052.00 TO NODE  12051.00 IS CODE =  62

  >>>>>COMPUTE  STREET  FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================ ;==========  ==========  ========  ========:= ====
  UPSTREAM ELEVATION(FEET) =  566.60  DOWNSTREAM ELEVATION(FEET)    552.70
  STREET LENGTH(FEET) =   511.90   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET} = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET  CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION  FACTOR  for Streetflow  Section(curb-to-curb)  =    0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS}         1.81
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET} =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.79
    AVERAGE FLOW VELOCITY(FEET/SEC.)       2.62
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.}      0.68
  STREET FLOW TRAVEL TIME(MIN.) =   3.26   Tc(MIN.)     10.48
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.613
  *USER  SPECIFIED(SUBAREA} :
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II} =   0
  SUBAREA  AREA(ACRES)      1.10      SUBAREA RUNOFF(CFS}  =    2.98
  TOTAL AREA(ACRES) =      1.20        PEAK FLOW RATE(CFS}          3.30

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET)    10.03
  FLOW VELOCITY(FEET/SEC.) =  3.02   DEPTH*VELOCITY( FT*FT/SEC.)     0.92
  LONGEST FLOWPATH FROM NODE  12053.00 TO NODE  12051.00 =   611.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12051.00 TO NODE  12050.00 IS CODE =  31
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) = 546.10  DOWNSTREAM(FEET)     546.00
  FLOW LENGTH(FEET) =     4.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.86
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      3.30
  PIPE TRAVEL TIME(MIN.) =  0.01    Tc(MIN.) =  10.49
  LONGEST FLOWPATH FROM NODE  12053.00 TO NODE  12050.00     616.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12050.00 TO NODE  12050.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================--==   ==========================  =
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)    10.49
  RAINFALL INTENSITY(INCH/HR) =   3.61
  TOTAL STREAM AREA(ACRES) =     1.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.30

****************************************************************************
  FLOW PROCESS FROM NODE  12056.00 TO NODE  12055.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=:==========  ====÷==  ======  •===;=  ============================  ====
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.22(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    567.00
  DOWNSTREAM ELEVATION(FEET) =    565.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.221
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) : 4.867
  SUBAREA RUNOFF(CFS)        0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
  FLOW PROCESS FROM NODE  12055.00 TO NODE  12054.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
====================  ========  =====  ========  =======  ==  ===  ==========
  UPSTREAM ELEVATION(FEET) =  565.00  DOWNSTREAM ELEVATION(FEET)    552.70
  STREET LENGTH(FEET) =   477.20   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)     0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)        2.40
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.82
    AVERAGE FLOW VELOCITY(FEET/SEC.)      2.77
```

```
  PRODUCT OF DEPTH&VELOCITY( FT*FT/SEC.}       0.78
 STREET FLOW TRAVEL TIME(MIN.) =   2.87   Tc(MIN.)    l0.09
  50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.684
 *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)       1.50      SUBAREA RUNOFF(CFS)      4.14
 TOTAL AREA(ACRES} =       1.60        PEAK FLOW RATE(CFS)          4.46

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET)    11.49
 FLOW VELOCITY(FEET/SEC.) =  3.17   DEPTH*VELOCITY(FT*FT /SEC.)     1.06
 LONGEST FLOWPATH FROM NODE  12056.00 TO NODE  12054.00 =   577.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12054.00 TO NODE  12050.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========  =======  ================  ==========  =====  ;==================  ==
 ELEVATION DATA: UPSTREAM(FEET) =   546.50  DOWNSTREAM(FEET)      546.00
 FLOW LENGTH(FEET) =    24.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     7.15
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       4.46
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  10.15
 LONGEST FLOWPATH FROM NODE  12056.00 TO NODE  12050.00     601.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12050.00 TO NODE  12050.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
====================  ===  ===========  ====================  ===========  =  =
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.)     10.15
 RAINFALL INTENSITY(INCH/HR) =    3.67
 TOTAL STREAM AREA(ACRES) =      1.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.46

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1       14.78     11.75         3.385          5.60
     2        3.30     10.49         3.611          1.20
     3        4.46     10.15         3.673          1.60

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     {MIN.)    (INCH/HOUR)
     1       21.32     10.15        3.673
     2       21.54     10.49        3.611
     3       21.98     11.75        3.385

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        21.98   Tc(MIN.) =    11.75
 TOTAL AREA(ACRES) =       B.40
 LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12050. 00    1219.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12050.00 TO NODE  12049.00 IS CODE =  31
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ELEVATION DATA: UPSTREAM(FEET) =   545.20  DOWNSTREAM(FEET)      539.40
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     12.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     21.98
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =  11.96
  LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12049.00    1384.70 FEET.

 ****************************************************************************
  FLOW PROCESS FROM NODE  12049.00 TO NODE  12049.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     11.96
  RAINFALL INTENSITY(INCH/HR) =   3.35
  TOTAL STREAM AREA(ACRES) =     8.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.98

 ****************************************************************************
  FLOW PROCESS FROM NODE  12100.00 TO NODE  12101.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =    0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  5-MIN. ADDED =  11.50(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   348.40
  UPSTREAM ELEVATION(FEET) =    550.00
  DOWNSTREAM ELEVATION(FEET) =    548.90
  ELEVATION DIFFERENCE(FEET) =      1.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)     11.499
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.430
  SUBAREA RUNOFF(CFS)        2.06
  TOTAL AREA(ACRES) =      0.80   TOTAL RUNOFF(CFS)        2.06

 ****************************************************************************
  FLOW PROCESS FROM NODE  12101.00 TO NODE  12049.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ELEVATION DATA: UPSTREAM(FEET) =   542.80  DOWNSTREAM(FEET)     539.60
  FLOW LENGTH(FEET) =   319.80   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     4.45
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      2.06
  PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =  12.70
  LONGEST FLOWPATH FROM NODE  12100.00 TO NODE  12049.00     668.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12049.00 TO NODE  12049.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
  TOTAL NUMBER OF STREAMS =  2
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 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)     12.70
 RAINFALL INTENSITY(INCH/HR) =  3.21
 TOTAL STREAM AREA(ACRES) =      o.ao
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.06

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1       21.98     11.96         3.346         8.40
     2        2.06     12.70         3.215         0.80

 RAINFALL INTENSITY AlfD TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc      INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1       23.96     11.96        3.346
     2       23.17     12.70        3.215

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        23.96   Tc (MIN.) =   11. 96
 TOTAL AREA(ACRES) =        9.20
 LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12049.00    1384.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12049.00 TO NODE  12042.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE  (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   539.10  DOWNSTREAM(FEET)     535.90
 FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        10.82
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      23.96
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =  12.20
 LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12042.00    1540.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12042.00 TO NODE  12042.00 IS CODE =   1

 >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE< <<<<
=====  ==================== ================== ================ =============
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)     12.20
 RAINFALL INTENSITY(INCH/HR) =   3.30
 TOTAL STREAM AREA(ACRES) =      9.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.96

****************************************************************************
 FLOW PROCESS FROM NODE  12045.00 TO NODE  12044.00 IS CODE =  21

 >>>>>RATIONAL METHOD  INITIAL SUBAREA ANALYSIS< <<<<
====;==========C==================== ========================    =============
  *USER SPECIFIED(SUBAREA):
 MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .6500
 S.C.S. CURVE NUMBER (AMC II) =    0
 URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.20 (MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    557.80
 DOWNSTREAM ELEVATION(FEET) =     555.70
 ELEVATION DIFFERENCE(FEET) =      2.10
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.198
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    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.877
  SUBAREA RUNOFF(CFS)         0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.32

****************************************************************************
  FLOW PROCESS FROM NODE  12044.00 TO NODE  12043.00 IS CODE =  61

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
========== ========================================== ================= ====
  UPSTREAM ELEVATION(FEET) =  555.70  DOWNSTREAM ELEVATION(FEET)    542.20
  STREET LENGTH(FEET) =   574.90   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)    0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         3.45
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.29
    AVERAGE FLOW VELOCITY(FEET/SEC.)       2.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.97
  STREET FLOW TRAVEL TIME(MIN.) =   3.27   Tc(MIN.)    10.47
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.616
  *USER SPECIFIED(SUBAREA) :
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER  (AMC II) =   0
  SUBAREA AREA(ACRES)      2.30      SUBAREA RUNOFF(CFS)      6.24
  TOTAL AREA(ACRES) =      2.40        PEAK FLOW RATE(CFS)         6.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET)    13.46
  FLOW VELOCITY(FEET/SEC.) =  3.39   DEPTH*VELOCITY(FT*FT/SEC. )     1.34
  LONGEST FLOWPATH FROM NODE  12045.00 TO NODE  12043.00 =   674.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12043.00 TO NODE  12042.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========= ====;============== ============================ ==================
  ELEVATION DATA: UPSTREAM(FEET) =   536.50  DOWNSTREAM(FEET)      536.40
  FLOW LENGTH(FEET) =     4.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     8.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      6.55
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =  10.48
  LONGEST FLOWPATH FROM NODE  12045.00 TO NODE  12042.00     679.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12042.00 TO NODE  12042.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 =  ========================================================   =============
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)    10.48
  RAINFALL INTENSITY(INCH/HR)     3.61
  TOTAL STREAM AREA(ACRES) =     2.40
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 PEAK FLOW RATE(CFS) AT CONFLUENCE =     6.55

****************************************************************************
  FLOW PROCESS FROM NODE  12048.00 TO NODE  12047.00 IS CODE =  21

  >>>>>RATIONAL METHdD INITIAL SUBAREA ANALYSIS<<<<<
============================  ======= ============ ========================== ==
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.35(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   105.60
  UPSTREAM ELEVATION(FEET) =    555.00
  DOWNSTREAM ELEVATION(FEET) =    553.20
  ELEVATION DIFFERENCE(FEET) =      1.80
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.354
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.811
  SUBAREA RUNOFF(CFS}        0.31
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.31

****************************************************************************
  FLOW PROCESS FROM NODE  12047.00 TO NODE  12046.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
=========================  ========== ============+================  ======
  UPSTREAM ELEVATION(FEET} =  553.20  DOWNSTREAM ELEVATION(FEET)    542.20
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) =  16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.57
    AVERAGE FLOW VELOCITY(FEET/SEC.)      2.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.70
  STREET FLOW TRAVEL TIME(MIN.) =   3.20   Tc(MIN.)    10.55
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.601
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)      1.30      SUBAREA RUNOFF(CFS)      3.51
  TOTAL AREA(ACRES) =      1.40        PEAK FLOW RATE(CFS)         3.82

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET} = 0.33   HALFSTREET FLOOD WIDTH(FEET)    11.06
  FLOW VELOCITY(FEET/SEC.) =  2.92   DEPTH*VELOCITY(FT*FT/SEC.)     0.95
  LONGEST FLOWPATH FROM NODE  12048.00 TO NODE  12046.00 =   591.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12046.00 TO NODE  12042.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==================== ========= ================= ====   ===========:==== === =
  ELEVATION DATA: UPSTREAM(FEET) =   536.90  DOWNSTREAM( FEET)     536.40
  FLOW LENGTH(FEET) =    21.80   MANNING'S N 0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
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 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     7.13
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      3.82
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  10.60
 LONGEST FLOWPATH FROM NODE  12048.00 TO NODE  12042.00     613.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12042.00 TO NODE  12042.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==================== ======================================   ================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.)    10.60
 RAINFALL INTENSITY(INCH/HR) =   3.59
 TOTAL STREAM AREA(ACRES) =     1.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.82

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1       23.96    12.20        3.303          9.20
     2        6.55    10.48        3.614          2.40
     3        3.82    10.60        3.591          1.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
     1       32.25    10.48       3.614
     2       32.37    10.60       3.591
     3       33.47    12.20       3.303

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)       33.47   Tc(MIN.) =   12.20
 TOTAL AREA(ACRES) =     13.00
 LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12042.00    1540.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12042.00 TO NODE  12041.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   535.60  DOWNSTREAM(FEET)     535.10
 FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     9.07
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     33.47
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  12.29
 LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12041.00    1588.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12041.00 TO NODE  12061.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   534.30  DOWNSTREAM(FEET)     531.60
 FLOW LENGTH(FEET) =   275.60   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.6
 INCHES PIPE-FLOW VELOCITY(FEET/SEC.) 8.84
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES     1
```

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  PIPE-FLOW(CFS) =   33.47
  PIPE TRAVEL TIME (MIN.) =    0.52     Tc (MIN.) =  12.81
  LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12061.00    1864.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12061.00 TO NODE  12080.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================ ==================== = ============
  ELEVATION DATA: UPSTREAM(FEET) =   531.30  DOWNSTREAM(FEET)      528.80
  FLOW LENGTH(FEET) =   207.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      9.63
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     33.47
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  13.17
  LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12080.00    2072.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12080.00 TO NODE  12080.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)    13.17
  RAINFALL INTENSITY(INCH/HR) =   3.13
  TOTAL STREAM AREA(ACRES) =    13.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     33.47

****************************************************************************
  FLOW PROCESS FROM NODE  12082.00 TO NODE  12081.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======= = ======================= = ==== = ========== ====================
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.45(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    92.00
  UPSTREAM ELEVATION(FEET) =    539.40
  DOWNSTREAM ELEVATION(FEET) =    538.40
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.448
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.772
  SUBAREA RUNOFF(CFS)        0.43
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.43

 ****************************************************************************
  FLOW PROCESS FROM NODE  12081.00 TO NODE  12080.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========  ==== ============== ============= ==== ============== ========= ===
  ELEVATION DATA: UPSTREAM(FEET) =   531.30  DOWNSTREAM(FEET)      530.30
  FLOW LENGTH(FEET) =    10.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     6.23
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      0.43
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   7.48
  LONGEST FLOWPATH FROM NODE  12082.00 TO NODE  12080.00     102.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12080.00 TO NODE  12080.00 IS CODE =   1
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  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================   ========= ===;======= ============
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)      7.48
  RAINFALL INTENSITY(INCH/HR) =   4.76
  TOTAL STREAM AREA(ACRES) =     0.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.43

****************************************************************************
  FLOW PROCESS FROM NODE  12085.00 TO NODE  12084.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
====+=================================+  ========================== ====
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER  (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.32(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    551.30
  DOWNSTREAM ELEVATION(FEET) =    550.10
  ELEVATION DIFFERENCE(FEET) =      1.20
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.316
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =   4.827
  SUBAREA RUNOFF(CFS)        0.43
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.43

****************************************************************************
  FLOW PROCESS FROM NODE  12084.00 TO NODE  12083.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
 ================ = ====== ============== ================== ==============
  UPSTREAM ELEVATION(FEET) =  550.10  DOWNSTREAM ELEVATION(FEET)    538.40
  STREET LENGTH(FEET) =  1190.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.29
    AVERAGE FLOW VELOCITY(FEET/SEC.)       1.84
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.57
  STREET FLOW TRAVEL TIME(MIN.) =  10.79   Tc(MIN.)     18.10
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    2.552
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
  S.C.S. CURVE NUMBER  (AMC II) =   0
  SUBAREA AREA(ACRES)       1.40      SUBAREA RUNOFF(CFS)       3.22
  TOTAL AREA(ACRES) =       1.50        PEAK FLOW RATE(CFS)         3.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET)    12.78
  FLOW VELOCITY(FEET/SEC.) =  2.12   DEPTH*VELOCITY(FT*FT /SEC.)      0.77
  LONGEST FLOWPATH FROM NODE  12085.00 TO NODE  12083.00 =  1280.00 FEET.

 ****************************************************************************
```

```
 FLOW PROCESS FROM NODE  12083.00 TO NODE  12080.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =   530.70  DOWNSTREAM(FEET)     530.30
 FLOW LENGTH{FEET) =    22.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     6.44
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS} =      3.65
 PIPE TRAVEL TIME{MIN.) =   0.06    Tc(MIN.) =  18.16
 LONGEST FLOWPATH FROM NODE  12085.00 TO NODE  12080.00    1302.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12080.00 TO NODE  12080.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =  18.16
 RAINFALL INTENSITY(INCH/HR} =   2.55
 TOTAL STREAM AREA(ACRES} =     1.50
 PEAK FLOW RATE(CFS} AT CONFLUENCE =      3.65

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY       AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR}     (ACRE)
     1       33.47    13.17        3.129         13.00
     2        0.43     7.48        4.760          0.10
     3        3.65    18.16        2.547          1.so

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
     1       24.38     7.48       4.760
     2       36.72    13.17       3.129
     3       31.12    18.16       2.547

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE{CFS}       36.72   Tc(MIN.} =   13.17
 TOTAL AREA(ACRES} =     14.60
 LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12080.00    2072.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12080.00 TO NODE  12086.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE {NON-PRESSURE FLOW)<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =   528.40  DOWNSTREAM(FEET)     527.80
 FLOW LENGTH(FEET} =    64.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)       8.71
 ESTIMATED PIPE DIAMETER(INCH} =  30.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     36.72
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.} =  13.30
 LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12086.00    2136.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12086.00 TO NODE  12086.00 IS CODE =  10
```

```
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================   ================== ====================== ====

**************************************************************************
  FLOW PROCESS FROM NODE   6000.00 TO NODE   6001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<< <<<
==========================================   =================  =============
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.04(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   170.00
  UPSTREAM ELEVATION(FEET) =    570.10
  DOWNSTREAM ELEVATION(FEET) =    555.04
  ELEVATION DIFFERENCE(FEET) =     15.06
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.036
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.945
  SUBAREA RUNOFF(CFS)        1.4B
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS)        1.48

**************************************************************************
  FLOW PROCESS FROM NODE   6001.00 TO NODE   6002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==     -=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) = 555.04   DOWNSTREAM(FEET)      549.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  750.00  CHANNEL SLOPE    0.00Bl
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.510
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     11.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC .)     3.11
  AVERAGE FLOW DEPTH(FEET)     0.94   TRAVEL TIME(MIN.) =   4.02
  Tc(MIN.) =  11.05
  SUBAREA AREA(ACRES)       7.40       SUBAREA RUNOFF(CFS)     19.48
  TOTAL AREA(ACRES) =      7.80         PEAK FLOW RATE(CFS) =      20.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.26   FLOW VELOCITY(FEET/SEC.)     3.66
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6002.00 =   920.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6002.00 TO NODE  12089.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<< <<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========  ======  ==========  =======  ===  =;================  ====  ====
  ELEVATION DATA: UPSTREAM(FEET) =   542.50  DOWNSTREAM(FEET)     532.80
  FLOW LENGTH(FEET) =    71.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)    21.51
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     20.97
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  11.11
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE  12089.00     991.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12089.00 TO NODE  12088.00 IS CODE =  31
```

```
  >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ----------    ------------------------------------------------------------==
  ELEVATION  DATA: UPSTREAM(FEET)  =    532.40  DOWNSTREAM{FEET)  =    531.20
  FLOW LENGTH(FEET)  =    121.40    MANNING'S  N     0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC. )     7.74
  ESTIMATED  PIPE DIAMETER(INCH)  =   24.00     NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      20.97
  PIPE TRAVEL TIME{MIN.) =    0.26     Tc{MIN.) =   11.37
  LONGEST FLOWPATH FROM NODE    6000.00 TO NODE   12088.00     1112.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   12088.00 TO NODE   12088.00 IS CODE =    1

  >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE<<<<<
============================  =======;==== ========= ========================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   1 ARE:
  TIME OF CONCENTRATION(MIN.)     11.37
  RAINFALL INTENSITY{INCH/HR)  =    3.45
  TOTAL STREAM AREA{ACRES)  =     7.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE  =      20.97

****************************************************************************
  FLOW PROCESS FROM NODE    7000.00 TO NODE    7001.00 IS CODE =   21

  >>>>>RATIONAL  METHOD  INITIAL  SUBAREA  ANALYSIS<<<<<
============================; ==  ;====================================
  *USER SPECIFIED{SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .8500
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED  {USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH   6-MIN. ADDED =    9.42(MIN. )
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    200.00
  UPSTREAM ELEVATION(FEET)  =     551.40
  DOWNSTREAM ELEVATION{FEET) =     550.30
  ELEVATION DIFFERENCE(FEET)  =       1.10
  URBAN SUBAREA OVERLAND TIME OF FLOW{MIN.)       9.423
    SO YEAR RAINFALL  INTENSITY{INCH/HOUR)  =   3.942
  SUBAREA RUNOFF{CFS)         1.68
  TOTAL AREA(ACRES) =       0.50   TOTAL RUNOFF(CFS)         1.68

****************************************************************************
  FLOW PROCESS FROM NODE    7001.00 TO NODE    7002.00 IS CODE =   51

  >>>>>COMPUTE  TRAPEZOIDAL  CHANNEL  FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA {EXISTING ELEMENT)<<<<<
=== ================================= ======= = = ;;======================== ====
  ELEVATION   DATA:   UPSTREAM(FEET)   =  550.30   DOWNSTREAM(FEET)       542.80
  CHANNEL  LENGTH  THRU  SUBAREA{FEET)  =   850.00  CHANNEL  SLOPE     0.0088
  CHANNEL BASE(FEET)       2.00    "Z" FACTOR =    2.000
  MANNING'S  FACTOR  =  0.030   MAXIMUM DEPTH(FEET) =    2.00
    50 YEAR RAINFALL  INTENSITY( INCH/HOUR) =  3.063
  *USER SPECIFIED{SUBAREA):
  MOBILE  HOME  DEVELOPMENT  RUNOFF  COEFFICIENT  =  .8500
  S.C.S.  CURVE  NUMBER  {AMC II) =    0
  TRAVEL  TIME  COMPUTED  USING  ESTIMATED  FLOW{CFS)  =       14.33
  TRAVEL  TIME  THRU  SUBAREA  BASED  ON  VELOCITY( FEET/SEC.)      3.44
  AVERAGE  FLOW  DEPTH(FEET)      1.03    TRAVEL  TIME{MIN.)  =    4.12
  Tc{MIN.)  =   13 .54
  SUBAREA AREA{ACRES)         9.60        SUBAREA RUNOFF(CFS)      24.99
  TOTAL AREA(ACRES)  =      10.10          PEAK FLOW RATE{CFS) =       26.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH{FEET) =  1.39    FLOW VELOCITY(FEET/SEC.)      4.03
  LONGEST FLOWPATH FROM NODE    7000.00 TO NODE    7002.00 =   1050.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    7002.00 TO NODE   12088.00 IS CODE =   31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ELEVATION DATA: UPSTREAM(FEET) =    532.50  DOWNSTREAM(FEET)     531.20
  FLOW LENGTH(FEET) =     90.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.6 INCHES
  PIPE-FLOW VELOCITY( FEET/SEC.)         9.73
  ESTIMATED PIPE DIAMETER( INCH) =   27 .00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       26.67
  PIPE TRAVEL TIME(MIN.) =    0.16    Tc (MIN. ) =   13.69
  LONGEST FLOWPATH FROM NODE    7000.00 TO NODE   12088.00    1140.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   12088.00 TO NODE   12086.00 IS CODE =    1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN .)    13.69
  RAINFALL  INTENSITY(INCH/HR) =    3 .04
  TOTAL STREAM AREA(ACRES) =     10.10
  PEAK FLOW RATE (CFS) AT CONFLUENCE =      26.67

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY      AREA
  NUMBER       (CFS)     (MIN .)   (INCH/HOUR)    (ACRE)
      1       20 .97    11 .37        3.453          7.80
      2       26.67     13.69         3.035         10 .10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS .

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1       44 .40    11.37        3.453
      2       45.09     13 .69       3 .035

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS :
  PEAK FLOW RATE (CFS)        45 .09   Tc (MIN.) =    13.69
  TOTAL AREA(ACRES) =      17 .90
  LONGEST FLOWPATH FROM NODE    7000 .00 TO NODE   12088.00    1140 .60  FEET.

 ****************************************************************************
  FLOW PROCESS FROM NODE   12088.00 TO NODE   12087.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ELEVATION  DATA; UPSTREAM(FEET)  =    530.70  DOWNSTREAM(FEET)      528.30
  FLOW  LENGTH(FEET) =    235.20   MANNING'S  N =  0.013
  DEPTH OF FLOW IN  33 .0 INCH PIPE IS  24 .2  INCHES
  PIPE-FLOW  VELOCITY(FEET/SEC.)         9.64
  ESTIMATED  PIPE DIAMETER( INCH) =  33.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      45.09
  PIPE TRAVEL TIME(MIN.) =    0.41    Tc (MIN.) =   14.10
  LONGEST  FLOWPATH  FROM NODE    7000.00 TO NODE   12087.00    1375 .80 FEET.

 k      ****************************************************************************
  FLOW PROCESS FROM NODE   12087.00 TO NODE   12060.00 IS CODE =   31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
=====  ==  =========  ====================  ============  ======  =======  ====
  ELEVATION DATA: UPSTREAM(FEET) =   528.00  DOWNSTREAM( FEET)     524.40
  FLOW LENGTH{FEET) =   242.10   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)    11.00
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =   45.09
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =  14.47
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12060.00    1617.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12060.00 TO NODE  12060.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========-===  ============================================================   ===
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)    14.47
  RAINFALL INTENSITY(INCH/HR) =   2.90
  TOTAL STREAM AREA(ACRES) =    17.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    45.09

****************************************************************************
  FLOW PROCESS FROM NODE   8000.00 TO NODE   8001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====================  ============  ===========  ================  ========
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER  (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.40(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
  UPSTREAM ELEVATION(FEET) =    546.00
  DOWNSTREAM ELEVATION(FEET) =    537.80
  ELEVATION DIFFERENCE(FEET) =      8.20
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.399
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.793
  SUBAREA RUNOFF(CFS)        0.93
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS)        0.93

****************************************************************************
  FLOW PROCESS FROM NODE   8001.00 TO NODE   8002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========  ===========  ====  ======================  =========-=  =  ======  =====
  ELEVATION DATA: UPSTREAM(FEET) =    537.80  DOWNSTREAM(FEET)      536.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  540.00  CHANNEL SLOPE    0.0033
  CHANNEL BASE(FEET)      2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    50 YEAR RAINFALL INTENSITY{INCH/HOUR) =  3.283
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)     1.83
  AVERAGE  FLOW  DEPTH(FEET)  0.79  TRAVEL  TIME(MIN. )     4.92
  Tc(MIN.) =  12.32
  SUBAREA AREA(ACRES)       3.90       SUBAREA RUNOFF(CFS)      8.32
  TOTAL AREA(ACRES) =      4.20        PEAK FLOW RATE(CFS) =       9.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.06   FLOW VELOCITY(FEET/SEC.)     2.13
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8002.00 =   720.00 FEET.
```

```
 ****************************************************************************
  FLOW PROCESS FROM NODE   8002.00 TO NODE  12060.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ==========================================    ============== ======== ========= ====
  ELEVATION DATA: UPSTREAM(FEET) =   527.00  DOWNSTREAM(FEET)      525.40
  FLOW LENGTH(FEET) =    82.40   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      9.26
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  12.48
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE  12060.00     802.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12060.00 TO NODE  12060.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================:2;=====================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)     12.48
  RAINFALL INTENSITY(INCH/HR) =   3.25
  TOTAL STREAM AREA(ACRES) =     4.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.26

****************************************************************************
  FLOW PROCESS FROM NODE   5000.00 TO NODE   5001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=================;================ ============= ======== ============== =======
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.93(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
  UPSTREAM ELEVATION(FEET) =    587.20
  DOWNSTREAM ELEVATION(FEET) =    554.80
  ELEVATION D FFERENCE(FEET) =     32.40
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.931
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.989
  SUBAREA RUNOFF(CFS)        1.50
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS)        1.50

****************************************************************************
  FLOW PROCESS FROM NODE   5001.00 TO NODE   5002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======   =====  ==================  =•=======================================
  ELEVATION DATA: UPSTREAM(FEET) =    554.80  DOWNSTREAM(FEET)       547.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE    0.0097
  CHANNEL BASE(FEET)      2.00    "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.633
  *USER SPECIFIED(SUBAREA):
  MOBILE HOME DEVELOPMENT RUNOFF COEFFICIENT =  .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     17.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)     3.73
  AVERAGE FLOW DEPTH{FEET)     1.09   TRAVEL TIME(MIN.) =   3.44
  Tc(MIN.) =  10.37
  SUBAREA AREA(ACRES)      11.30       SUBAREA RUNOFF{CFS)     30.79
  TOTAL AREA(ACRES) =     11.70         PEAK FLOW RATE(CFS) =      32.28
```

```
 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.48   FLOW VELOCITY(FEET/SEC.)   4.38
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5002.00 =   970.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5002.00 TO NODE  12060.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =   537.10  DOWNSTREAM(FEET) =   525.40
 FLOW LENGTH(FEET) =    81.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    23.98
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =     32.28
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  10.43
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE  12060.00    1051.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12060.00 TO NODE  12060.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.)    10.43
 RAINFALL INTENSITY(INCH/HR) =   3.62
 TOTAL STREAM AREA(ACRES) =    11.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.28

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       45.09    14.47        2.896         17.90
     2        9.26    12.48        3.254          4.20
     3       32.28    10.43        3.622         11.70

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN. )   (INCH/HOUR)
     1       76.65    10.43        3.622
     2       78.39    12.48        3.254
     3       79.14    14.47        2.896

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)       79.14   Tc(MIN.) =   14.47
 TOTAL AREA(ACRES) =     33.80
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12060.00    1617.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12060.00 TO NODE  12099.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =   524.00  DOWNSTREAM(FEET)      522.20
 FLOW LENGTH(FEET) =   147.80   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    11.82
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =     79.14
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =  14.68
```

```
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12099.00 =  1765.70  FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12099.00 TO NODE  12099.00 IS CODE =  10

 >>>>>MAIN-STREAM  MEMORY  COPIED ONTO MEMORY  BANK  #  3 <<<<<
================================    ========================================

****************************************************************************
 FLOW PROCESS FROM NODE  12059.00 TO NODE  12059.00 IS CODE =   7

 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
====================================;  ====================   =============
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  14.23   RAIN  INTENSITY(INCH/HOUR) =  2.94
 TOTAL AREA(ACRES) =   163.60   TOTAL  RUNOFF(CFS) =    446.33

****************************************************************************
 FLOW PROCESS FROM NODE  12059.00 TO NODE  12090.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========     ;=============================================================
 ELEVATION DATA: UPSTREAM(FEET) =   540.40  DOWNSTREAM(FEET)      525.70
 FLOW  LENGTH(FEET) =   633.80   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  49.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    23.17
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =    446.33
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =  14.69
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12090.00    2399.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12090.00 TO NODE  12090.00 IS CODE =  10

 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
================= ===============    ========================================

****************************************************************************
 FLOW PROCESS FROM NODE  12093.00 TO NODE  12092.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================="============ ============ ========;;======
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.47(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
 UPSTREAM ELEVATION(FEET) =    558.50
 DOWNSTREAM ELEVATION(FEET) =    557.60
 ELEVATION DIFFERENCE(FEET) =     0.90
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)     7.470
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.762
 SUBAREA RUNOFF(CFS)       0.43
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)       0.43

****************************************************************************
 FLOW PROCESS FROM NODE  12092.00 TO NODE  12091.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>> (STREET TABLE SECTION #  2 USED)<<<<<
 ====================== ====================== ======   ========
 UPSTREAM ELEVATION(FEET) =  557.60  DOWNSTREAM ELEVATION(FEET)    537.50
 STREET LENGTH(FEET) =   978.80   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
```

```
 INSIDE STREET CROSSFALL(DECIMAL} =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.52
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.30
   HALFSTREET FLOOD WIDTH(FEET} =    9.51
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.54
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.75
 STREET FLOW TRAVEL TIME(MIN.) =   6.41   Tc(MIN.}    13.88
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.001
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =    0
 SUBAREA AREA(ACRES)       1.50      SUBAREA RUNOFF(CFS}      4.05
 TOTAL AREA(ACRES) =       1.60        PEAK FLOW RATE(CFS)          4.48

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET)    12.00
 FLOW VELOCITY(FEET/SEC.) =  2.93   DEPTH*VELOCITY(FT*FT/SEC.)       1.01
 LONGEST FLOWPATH FROM NODE  12093.00 TO NODE  12091.00 =  1068.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12091.00 TO NODE  12090.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========   ========== ================================================
 ELEVATION DATA: UPSTREAM(FEET) =   531.20  DOWNSTREAM(FEET)      525.70
 FLOW LENGTH(FEET) =     5.80   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    27.95
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       4.48
 PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =  13.89
 LONGEST FLOWPATH FROM NODE  12093.00 TO NODE  12090.00    1074.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12090.00 TO NODE  12090.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
======================    ======;====;====== ===================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc      INTENSITY      AREA
 NUMBER        (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         4.48     13.89        3.001         1.60
 LONGEST FLOWPATH FROM NODE  12093.00 TO NODE  12090.00    1074.60 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc                     AREA
 NUMBER        (CFS)              INTENSIT     (ACRE)
     ▮      446.33      Y                     163.60
                       (MIN.)   (INCH/HOUR)
                       14.69     2.857
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12090.00    2399.50 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1      429.39      13.89         3.001
     2      450.60      14.69         2.857

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS)      450.60   Tc(MIN.)     14.69
  TOTAL AREA(ACRES)  =    165.20

****************************************************************************
  FLOW PROCESS FROM NODE  12090.00 TO NODE  12090.00 IS CODE =  12

  >>>>>CLEAR MEMORY BANK # 2 <<<<<
==================  ===================================  ==================

****************************************************************************
  FLOW PROCESS FROM NODE  12090.00 TO NODE  12888.00 IS CODE =  31

  >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
========== ========================= ======= ==========;======= ============
  ELEVATION DATA: UPSTREAM(FEET) =   525.70  DOWNSTREAM(FEET)      525.40
  FLOW LENGTH(FEET) =     22.36   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        18.79
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =    450.60
  PIPE TRAVEL TIME(MIN.) =    0.02    Tc(MIN.) =  14.71
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12888.00    2421.86 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12090.00 TO NODE  12888.00 IS CODE =  10

  >>>>>MAIN-STREAM  MEMORY  COPIED  ONTO  MEMORY  BANK  # 2 <<<<<
============================================  ======== ==  ================ =

****************************************************************************
  FLOW PROCESS FROM NODE  12096.00 TO NODE  12095.00 IS CODE =  21

  >>>>>RATIONAL  METHOD  INITIAL  SUBAREA  ANALYSIS<< <<<

  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.58(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   102.60
  UPSTREAM  ELEVATION(FEET)  =    551.30
  DOWNSTREAM  ELEVATION(FEET)  =    550.20
  ELEVATION DIFFERENCE(FEET) =      1.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.}      7.583
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.715
  SUBAREA RUNOFF(CFS)        0.42
  TOTAL AREA(ACRES)  =      0.10   TOTAL RUNOFF(CFS)        0.42

****************************************************************************
  FLOW  PROCESS  FROM NODE  12095.00  TO  NODE  12094.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==================   ==============================;  ======================
  UPSTREAM  ELEVATION(FEET} =  550.20  DOWNSTREAM  ELEVATION(FEET)     537.50
  STREET LENGTH(FEET) =  1217.60   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.21
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.29
    AVERAGE FLOW VELOCITY(FEET/SEC.)      1.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.60
  STREET FLOW TRAVEL TIME(MIN.)    10.53   Tc(MIN.)    18.11
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    2.551
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT "' .9000
  S.C.S. CURVE NUMBER  (AMC II) =    0
  SUBAREA AREA(ACRES) =     1.50      SUBAREA RUNOFF(CFS)      3.44
  TOTAL AREA(ACRES) =      1.60        PEAK FLOW RATE(CFS)         3.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET)    12.95
  FLOW VELOCITY(FEET/SEC.) =  2.19   DEPTH*VELOCITY(FT*FT/SEC.)     0.80
  LONGEST FLOWPATH FROM NODE  12096.00 TO NODE  12094.00 =  1320.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12094.00 TO NODE  12094.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========  ====================== ==== ===== ====================  ========
  TOTAL NUMBER' OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)    18.11
  RAINFALL INTENSITY(INCH/HR) =   2.55
  TOTAL STREAM AREA(ACRES) =     1.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.87

****************************************************************************
  FLOW PROCESS FROM NODE  12098.00 TO NODE  12097.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.47(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    558.50
  DOWNSTREAM ELEVATION(FEET) =    557.60
  ELEVATION DIFFERENCE(FEET) =      0.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.470
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.762
  SUBAREA RUNOFF(CFS)        0.43
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.43

****************************************************************************
  FLOW PROCESS FROM NODE  12097.00 TO NODE  12094.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==========  ========  ========  =  ==  =; ;=====;;=========  ==========
  UPSTREAM ELEVATION(FEET) =  557.60  DOWNSTREAM ELEVATION(FEET)    537.50
  STREET LENGTH(FEET) =   975.30   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.64
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    7.88
   AVERAGE FLOW VELOCITY(FEET/SEC.)       2.32
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.61
  STREET FLOW TRAVEL TIME(MIN.) =   7.02   Tc(MIN.)    14.49
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    2.892
  *USER SPECIFIED(SUBAREA) :
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)       0.90      SUBAREA RUNOFF(CFS)      2.34
  TOTAL AREA(ACRES) =       1.00        PEAK FLOW RATE(CFS)         2.77

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET)     9.86
  FLOW VELOCITY(FEET/SEC.) =  2.62   DEPTH*VELOCITY( FT*FT/SEC.)     0.79
  LONGEST FLOWPATH FROM NODE  12098.00 TO NODE  12094.00 =  1065.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12094.00 TO NODE  12094.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)     14.49
  RAINFALL INTENSITY(INCH/HR) =   2.89
  TOTAL STREAM AREA(ACRES) =      1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.77

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY      AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
      1         3.87     18.11         2.551          1.60
      2         2.77     14.49         2.892          1.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1         6.18     14.49        2.892
      2         6.31     18.11        2.551

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)         6.31   Tc(MIN.) =   18.11
  TOTAL AREA(ACRES) =         2.60
  LONGEST FLOWPATH FROM NODE  12096.00 TO NODE  12094.00    1320.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12094.00 TO NODE  12888.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   531.20  DOWNSTREAM(FEET)     525.40
  FLOW LENGTH(FEET) =     22.80   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) -  19.44
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       6.31
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   18.13
  LONGEST FLOWPATH FROM NODE  12096.00 TO NODE  12888.00 =  1343.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE  12094.00 TO NODE  12888.00 IS CODE =  11

  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<


  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1        6.31     18.13         2.550         2.60
  LONGEST FLOWPATH FROM NODE  12096.00 TO NODE  12888.00     1343.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1      450.60     14.71         2.853       165,20
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12888.00     2421.86 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF        Tc       INTENSITY
  NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
      1      456.24       14.71         2.853
      2      409.02       18.13         2.550

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)       456.24    Tc(MIN.) =    14.71
  TOTAL AREA(ACRES) =       167.80

****************************************************************************
  FLOW PROCESS FROM NODE  12094.00 TO NODE  12888.00 IS CODE =  12

  >>>>>CLEAR MEMORY BANK # 2 <<<<<


****************************************************************************
  FLOW PROCESS FROM NODE  12888.00 TO NODE  12086.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================    ============================================
  ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM( FEET)      524.80
  FLOW LENGTH(FEET) =     80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  39.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)         36.84
  ESTIMATED PIPE DIAMETER(INCH) =  54.00     NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =    456.24
  PIPE TRAVEL TIME(MIN.) =   0.04     Tc(MIN.) =  14.74
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12086.00     2501.86 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  12086.00 TO NODE  12086.00 IS CODE =  11

  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==========;== ============================== ============== ==============

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1      456.24     14.74    2.846         167.80
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12086.00     2501.86 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1       36.72     13.30        3.107        14.60
  LONGEST FLOWPATH FROM NODE  12065.00 TO NODE  12086.00     2136.50 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc      INTENSITY
 NUMBER       (CFS)     (MIN. )    (INCH/HOUR)
     1      454.72       13.30         3.107
     2      489.88       14.74         2.846

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)       489.88    Tc (MIN.) =    14.74
 TOTAL AREA(ACRES) =     182.40

****************************************************************************
 FLOW PROCESS FROM NODE  12086.00 TO NODE  12099.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =    523.80   DOWNSTREAM(FEET)      522.20
 FLOW LENGTH(FEET) =     80.20    MANNING'S N =  0.013
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  54.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        22.23
 ESTIMATED PIPE DIAMETER(INCH) =  69.00     NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     489.88
 PIPE TRAVEL TIME(MIN.) =    0.06     Tc(MIN.) =  14.80
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12099.00     2582.06 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  12099.00 TO NODE  12099.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
========= ============================================  ===============   =

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER        (CFS)   (MIN.)    {INCH/HOUR)    (ACRE)
     1       489.88    14.80         2.836      182.40
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12099.00     2582.06 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER        (CFS)   {MIN.}    (INCH/HOUR}    (ACRE)
     1        79.14    14.68         2.858        33.80
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE  12099.00     1765.70  FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.}    (INCH/HOUR}
     1     565.14       14.68         2.858
     2     568.39       14.80         2.836

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)       568.39    Tc(MIN.) =    14.80
 TOTAL AREA(ACRES) =     216.20
============== ================  ==========  ========= ========================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)          216.20  TC(MIN.) =      14.80
 PEAK FLOW RATE(CFS)        568.39
========== === ====== ======= === ============ ======================   ==========
============== ====== ========== ==== ==== ==== ============= ====================
 END OF RATIONAL METHOD ANALYSIS
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 ************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. l.5A Release Date: 01/01/2003  License ID 1261

                           Analysis prepared by:

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                          San Diego, California 92110
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 ************************** DESCRIPTION OF STUDY **************************
* MCMILLIN OTAY RANCH, VILLAGE 7                                          *
* 50-YEAR STORM EVENT FOR BASIN 13000                                     *
* JN-14531A   SEPTEMBER 22, 2004                                          *
 ************************************************************************

  FILE: NAME: C:\aes2003\hydrosft\ratsex\13000a.DATl] TJl JLHJ[J[JLJJDD
  TIME/DATE OF STUDY: 10:31 09/22/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  5.800
   2)  10.000;  3.700
   3)  15.000;  2.800
   4)  20.000;  2.400
   5)  25.000;  2.000
   6)  30.000;  1.800
   7)  40.000;  1.500
   8)  50.000;  1.300
   9)  60.000;  1.200
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL   IN-  / OUT-/PARK-   HEIGHT  WIDTH   LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY     (FT)    (FT)  (FT)  (FT)    (n)
           ========  =============  ======         ======
  1   30.0     20.0    0.018/0.018/0.020    0.67    2.00 0.0313 0.167 0.0150
  2   16.0     11.0    0.020/0.020/0.020    0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

************************************************************************
  FLOW PROCESS FROM NODE  13001.00 TO NODE  13002.00 rS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======;===========================================;===;=;= ;=;=; ==  ===
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
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 S.C.S. CURVE NUMBER  (AMC II} =    0
 URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =7.21(MIN. )
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    97.40
 UPSTREAM ELEVATION(FEET) =    551.80
 DOWNSTREAM ELEVATION(FEET) =    549.90
 ELEVATION DIFFERENCE(FEET) =      1.90
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.208
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.873
 SUBAREA RUNOFF(CFS)         0.44
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.44

****************************************************************************
 FLOW PROCESS FROM NODE  13002.00 TO NODE  13003.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======== ========================= ============  ============================
 UPSTREAM ELEVATION(FEET) =  549.90  DOWNSTREAM ELEVATION(FEET)    539.20
 STREET LENGTH(FEET) =   820.80   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk  Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.82
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    9.08
   AVERAGE FLOW VELOCITY(FEET/SEC.)      1.99
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.57
 STREET FLOW TRAVEL TIME(MIN.) =   6.86   Tc(MIN.)    14.07
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    2.968
  *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER  (AMC II) =    0
 SUBAREA AREA(ACRES)       1.00      SUBAREA RUNOFF(CFS)      2.67
 TOTAL AREA(ACRES) =       1.10        PEAK FLOW RATE(CFS)         3.11

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET)    11.32
 FLOW VELOCITY(FEET/SEC.) =  2.28   DEPTH*VELOCITY(FT*FT/SEC.)      0.75
 LONGEST FLOWPATH FROM NODE  13001.00 TO NODE  13003.00 =   918.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  13003.00 TO NODE  13004.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
== ========================= ========== ============== ================ ======
 ELEVATION DATA: UPSTREAM(FEET) =   533.80  DOWNSTREAM(FEET)      532.70
 FLOW LENGTH(FEET) =    11.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     11.25
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      3.11
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  14.08
 LONGEST FLOWPATH FROM NODE  13001.00 TO NODE  13004.00     929.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  13004.00 TO NODE  13004.00 IS CODE =   1
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  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     14.08
  RAINFALL INTENSITY(INCH/HR) =   2.97
  TOTAL STREAM AREA(ACRES) =      1.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.11

****************************************************************************
  FLOW PROCESS FROM NODE  13005.00 TO NODE  13006.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =    0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.22(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    98.30
  UPSTREAM ELEVATION(FEET) =    551.80
  DOWNSTREAM ELEVATION(FEET) =    549.90
  ELEVATION DIFFERENCE(FEET) =      1.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.221
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.867
  SUBAREA RUNOFF(CFS)         0.44
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.44

****************************************************************************
  FLOW PROCESS FROM NODE  13006.00 TO NODE  13007.00 IS CODE    62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
  UPSTREAM ELEVATION(FEET) =  549.90  DOWNSTREAM ELEVATION(FEET)    539.20
  STREET LENGTH(FEET) =   827.50   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW{CFS)         2.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH{FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.94
    AVERAGE FLOW VELOCITY(FEET/SEC.)       2.10
    PRODUCT OF DEPTH&VELOCITY{FT*FT/SEC.)       0.64
  STREET FLOW TRAVEL TIME(MIN.) =   6.57   Tc(MIN.)     13.79
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.018
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES)       1.30      SUBAREA RUNOFF(CFS)       3.53
  TOTAL AREA(ACRES) :     1.40        PEAK FLOW RATE(CFS)          3.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET)    12.52
  FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.)     0.85
  LONGEST FLOWPATH FROM NODE  13005.00 TO NODE  13007.00 =   925.80 FEET.

****************************************************************************
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```
 FLOW PROCESS FROM NODE  13007.00 TO NODE  13004.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =   533.10  DOWNSTREAM(FEET)      532.70
 FLOW LENGTH(FEET) =    21.50   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     6.67
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      3.97
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  13.84
 LONGEST FLOWPATH FROM NODE  13005.00 TO NODE  13004.00     947.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  13004.00 TO NODE  13004.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================  =========  ====================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)     13.84
 RAINFALL INTENSITY(INCH/HR) =    3.01
 TOTAL STREAM AREA(ACRES) =      1.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.97

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        3.11    14.08        2.965          1.10
     2        3.97    13.84        3.008          1.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)    (MIN.)
     (INCH/HOUR)  1     7.03     13.84
                        3.008
     2        7.02    14.08        2.965

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)         7.03   Tc(MIN.) =    13.84
 TOTAL AREA(ACRES) =      2.50
 LONGEST FLOWPATH FROM NODE  13005.00 TO NODE  13004.00     947.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  13004.00 TO NODE  13008.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
=========  ============================ = ==========;========== == =========:
 ELEVATION DATA: UPSTREAM(FEET) ;  532.40  DOWNSTREAM(FEET)      531.50
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     6.11
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      7.03
 PIPE TRAVEL TIME(MIN.)     0.25    Tc(MIN.) =  14.09
 LONGEST FLOWPATH FROM NODE  13005.00 TO NODE  13008.00    1037.30 FEET.

'****************************************************************************
 FLOW PROCESS FROM NODE  13008.00 TO NODE  13009.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
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```
  ELEVATION DATA: UPSTREAM(FEET) =   531.10  DOWNSTREAM(FEET)      528.00
  FLOW LENGTH(FEET) =   172.20   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC. )     7.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      7.03
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   14.46
  LONGEST FLOWPATH FROM NODE  13005.00 TO NODE  13009.00    1209.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13009.00 TO NODE  13010.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE  (NON-PRESSURE FLOW)<<<<<
  ELEVATION DATA: UPSTREAM(FEET) =   527.70  DOWNSTREAM(FEET)      524.80
  FLOW LENGTH(FEET) =   296.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     6.06
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      7.03
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) = 15.28
  LONGEST FLOWPATH FROM NODE  13005.00 TO NODE  13010.00    1505.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13010.00 TO NODE  13010.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     15.28
  RAINFALL INTENSITY(INCH/HR) =   2.78
  TOTAL STREAM AREA(ACRES) =     2.50
  PEAK FLOW RATE{CFS) AT CONFLUENCE =      7.03

****************************************************************************
  FLOW PROCESS FROM NODE  13011.00 TO NODE  13012.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  *USER SPECIFIED(SUBAREA) :
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.89(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    66.10
  UPSTREAM ELEVATION(FEET) =    542.60
  DOWNSTREAM ELEVATION{FEET) =    541.30
  ELEVATION DIFFERENCE(FEET) =      1.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.894
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.005
  SUBAREA RUNOFF(CFS)        0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.45

****************************************************************************
  FLOW PROCESS FROM NODE  13012.00 TO NODE  13013.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
  UPSTREAM ELEVATION(FEET) =  541.30  DOWNSTREAM ELEVATION(FEET)    534.20
  STREET LENGTH(FEET) =   435.60   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) =  16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
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```
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.95
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =   0.28
   HALFSTREET FLOOD WIDTH(FEET) =    8.91
   AVERAGE FLOW VELOCITY(FEET/SEC.)      2.22
   PRODUCT OF DEPTH&VELOCITY{FT*FT/SEC.)      0.63
 STREET FLOW TRAVEL TIME(MIN.) =   3.28   Tc(MIN.)    10.17
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.669
 *USER SPECIFIED{SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)      0.90      SUBAREA RUNOFF(CFS)      2.97
 TOTAL AREA(ACRES) =      1.00        PEAK FLOW RATE(CFS)         3.42

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET)    11.32
 FLOW VELOCITY(FEET/SEC.) =  2.50   DEPTH*VELOCITY(FT*FT/SEC.)      0.83
 LONGEST FLOWPATH FROM NODE  13011.00 TO NODE  13013.00 =   501.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  13013.00 TO NODE  13010.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================  ===== ======= ==========  ================= ===
 ELEVATION DATA: UPSTREAM(FEET) =   525.20  DOWNSTREAM(FEET)      524.80
 FLOW LENGTH(FEET) =     4.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     11.38
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      3.42
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   10.18
 LONGEST FLOWPATH FROM NODE  13011.00 TO NODE  13010.00      506.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  13010.00 TO NODE  13010.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================  ========= ============================================  ===
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)     10.18
 RAINFALL INTENSITY(INCH/HR) =    3.67
 TOTAL STREAM AREA(ACRES) =      1.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.42

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         7.03    15.28        2.778          2.50
     2         3.42    10.18        3.668          1.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
```

```
      1        8.75    10.18       3.668
      2        9.63    15.28       2.778

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)         9.63   Tc(MIN.) =   15.28
  TOTAL AREA(ACRES) =         3.50
  LONGEST FLOWPATH FROM NODE  13005.00 TO NODE  13010.00    1505.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13010.00 TO NODE  13010.00 IS CODE =  10

  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE  13014.00 TO NODE  13015.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================== ==========================  ===== ==============
  *USER SPECIFIED(SUBAREA) :
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.38(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.50
  UPSTREAM ELEVATION(FEET) =    552.00
  DOWNSTREAM ELEVATION(FEET) =    540.40
  ELEVATION DIFFERENCE(FEET) =     11.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.381
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =   5.220
  SUBAREA RUNOFF(CFS)         0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.42

 ****************************************************************************
  FLOW PROCESS FROM NODE  13015.00 TO NODE  13016.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
====== ====================;=======;====================== ==============
  ELEVATION DATA: UPSTREAM(FEET) =   540.40  DOWNSTREAM(FEET)      534.30
  FLOW LENGTH(FEET) =   433.40   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     3.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      0.42
  PIPE TRAVEL TIME(MIN.) =   2.30    Tc(MIN.) =   8.68
  LONGEST FLOWPATH FROM NODE  13014.00 TO NODE  13016.00     498.90 FEET.

****************************************************************************** **
  FLOW PROCESS FROM NODE  13016.00 TO NODE  13016.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    4.253
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)      0.50   SUBAREA RUNOFF(CFS)      1.70
  TOTAL AREA(ACRES)        0.60   TOTAL RUNOFF(CFS) =     2.12
  TC(MIN.) =   8.68

****************************************************************************
  FLOW PROCESS FROM NODE  13016.00 TO NODE  13017.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   531.40  DOWNSTREAM(FEET)      526.00
  FLOW LENGTH(FEET) =    13.80   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)    16.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      2.12
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   8.70
  LONGEST FLOWPATH FROM NODE  13014.00 TO NODE  13017.00     512.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13017.00 TO NODE  13017.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================  ======= =======  ============ ===
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)      8.70
  RAINFALL INTENSITY(INCH/HR) =   4.25
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.12

****************************************************************************
  FLOW PROCESS FROM NODE  13018.00 TO NODE  13019.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======= ====================;========== ========== ======== ======= ======
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.82(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    61.20
  UPSTREAM ELEVATION(FEET) =    542.60
  DOWNSTREAM ELEVATION(FEET) =    541.30
  ELEVATION DIFFERENCE(FEET) =      1.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.817
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.037
  SUBAREA RUNOFF(CFS)        0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.45

****************************************************************************
  FLOW PROCESS FROM NODE  13019.00 TO NODE  13017.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==================== ================  ======== ========  ============ ====
  UPSTREAM ELEVATION(FEET) =  541.30  DOWNSTREAM ELEVATION(FEET)    534.20
  STREET LENGTH(FEET) =   433.20   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         1.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.57
    AVERAGE FLOW VELOCITY(FEET/SEC.)       2.18
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
```

```
 STREET FLOW TRAVEL TIME(MIN.) =   3.31   Tc(MIN.)    10.13
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.677
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)       0.80      SUBAREA RUNOFF(CFS)      2.65
 TOTAL AREA(ACRES) =       0.90        PEAK FLOW RATE(CFS)          3.10

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET)    10.80
 FLOW VELOCITY(FEET/SEC.) =  2.48   DEPTH*VELOCITY(FT*FT/SEC.)       0.79
 LONGEST FLOWPATH FROM NODE  13018.00 TO NODE  13017.00 =   494.40  FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  13017.00 TO NODE  13017.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================;    ========================== ;
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)    10.13
 RAINFALL INTENSITY(INCH/HR) =   3.68
 TOTAL STREAM AREA(ACRES) =     0.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.10

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       2.12     8.70        4.247         0.60
     2       3.10    10.13        3.677         0.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc       INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       4.80     8.70        4.247
     2       4.94    10.13        3.677

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        4.94   Tc(MIN.) =   10.13
 TOTAL AREA(ACRES) =      1.50
 LONGEST FLOWPATH FROM NODE  13014.00 TO NODE  13017.00     512.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  13017.00 TO NODE  13010.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====================  ================  ==========  ===============  =====
 ELEVATION DATA: UPSTREAM(FEET) =   525.70  DOWNSTREAM(FEET)     524.80
 FLOW LENGTH(FEET) =    46.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    7.20
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       4.94
 PIPE TRAVEL TIME(MIN.)      0.11    Tc(MIN.) =  10.23
 LONGEST FLOWPATH FROM NODE  13014.00 TO NODE  13010.00     559.00 FEET.

 ************************************    ************************************
 FLOW PROCESS FROM NODE  13010.00 TO NODE  13010.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
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```
 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         4.94     10.23        3.65B         1.50
 LONGEST FLOWPATH FROM NODE  13014.00 TO NODE  13010. 00     559.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    {MIN.)    {INCH/HOUR)    (ACRE)
     1         9.63     15.28        2.778         3.50
 LONGEST FLOWPATH FROM NODE  13005.00 TO NODE  13010.00    1505.50 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
     1       12.25       10.23         3.658
     2       13.37       15.28         2.778

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        13.37   Tc (MIN.) =   15.28
 TOTAL AREA(ACRES) =       5.00

****************************************************************************
 FLOW PROCESS FROM NODE  13010.00 TO NODE  13020.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATE D PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================    ===========  ======================
 ELEVATION DATA: UPSTREAM(FEET) =   524.50  DOWNSTREAM(FEET) =   523.50
 FLOW LENGTH(FEET) =    79.20   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.)     7.79
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     13.37
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  15.45
 LONGEST FLOWPATH FROM NODE  13005.00 TO NODE  13020.00    1584.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  13020.00 TO NODE  13020.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN. )    15.45
 RAINFALL INTENSITY(INCH/HR) =   2.76
 TOTAL STREAM AREA(ACRES) =     5.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.37

****************************************************************************
 FLOW PROCESS FROM NODE   9000.00 TO NODE   9001.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==================================================  ==================== =;
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT =  .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED {USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.3l(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   210.00
 UPSTREAM ELEVATION(FEET) =    573.50
 DOWNSTREAM ELEVATION(FEET) =    558.00
 ELEVATION DIFFERENCE(FEET) =     15.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.309
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    4.831
 SUBAREA RUNOFF(CFS) =      1.64
```

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  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.64

****************************************************************************
  FLOW PROCESS FROM NODE   9001.00 TO NODE   9002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA {EXISTING ELEMENT)<<<<<
==================;=;====================================; ==============
  ELEVATION DATA: UPSTREAM(FEET) =    558.00  DOWNSTREAM(FEET)      550.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1730.00  CHANNEL SLOPE     0.0042
  CHANNEL BASE(FEET)      2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.421
  *USER SPECIFIED(SUBAREA) :
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     81.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)      6.80
  AVERAGE FLOW DEPTH(FEET)     2.00   TRAVEL TIME(MIN.) =   4.24
  Tc(MIN.) =  11.55
  SUBAREA AREA(ACRES)      52.10       SUBAREA RUNOFF(CFS)    151.52
  TOTAL AREA(ACRES) =     52.50         PEAK FLOW RATE(CFS)       153.16

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.00   FLOW VELOCITY(FEET/SEC.)    12.76

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9002.00 =  1940.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9002.00 TO NODE  13020.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=== ========== =====•2 S====;= ====== ============== =========== ====
  ELEVATION DATA: UPSTREAM(FEET) =   539.20  DOWNSTREAM(FEET)      521.60
  FLOW LENGTH(FEET) =   128.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        34.89
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =    153.16
  PIPE TRAVEL TIME(MIN.) =   1.6     Tc(MIN.) =  11.61
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE  13020.00    2068.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  13020.00 TO NODE  13020.00 IS CODE     1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=======-============ ============= === ================ ==================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.61
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```
 RAINFALL INTENSITY(INCH/HR) =   3.41
 TOTAL STREAM AREA(ACRES) =    52.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    153.16

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       13.37   15.45        2.764          5.00
     2      153.16   11.61        3.410         52.50

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      164.00    11.61       3.410
     2      137.52    15.45       2.764

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)      164.00   Tc(MIN.) =   11.61
 TOTAL AREA(ACRES) =      57.50
 LONGEST FLOWPATH FROM NODE   9000.00 TO NODE  13020.00    2068.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  13020.00 TO NODE  13021.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<
 ELEVATION  DATA: UPSTREAM(FEET) =   521.10  DOWNSTREAM(FEET)  =   460.00
 FLOW LENGTH(FEET) =   192.80   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        47.42
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =    164.00
 PIPE TRAVEL TIME(MIN.) =   1.7     Tc(MIN.) =   11.68
 LONGEST FLOWPATH FROM NODE   9000.00 TO NODE  13021.00    2261.60 FEET.
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)           57.50  TC(MIN.) =     11.68
 PEAK FLOW RATE(CFS)        164.00
 END OF RATIONAL METHOD ANALYSIS
```

SYSTEM 14000

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. l.SA Release Date: 01/01/2003  License ID 1261

                            Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                            San Diego, California 92110
                         619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* MCMILLIN OTAY RANCH, VILLAGE 7                                          *
* 50-YEAR STORM EVENT FOR BASIN 14000                                     *
* JN-14531A   SEPTEMBER 22, 2004                                          *
 ************************.************************************************

  FILE NAME: C:\aes2003\hydrosft\ratscx\14000.DATDDDWOCIDDCICIDOO
  TIME/DATE OF STUDY: 10:34 09/22/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH} =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITYJ DATA PAIRS =  9
   1)   5.000;  5.800
   2)  10.000;  3.700
   3)  15.000;  2.800
   4)  20.000;  2.400
   5)  25.000;  2.000
   6)  30.000;  1.800
   7)  40.000;  1.500
   8)  50.000;  1.300
   9)  60.000;  1.200
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW A.ND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES :  MANNING
     WIDTH  CROSSFALL   IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE   FACTOR
NO.    (FT}      (FT)    SIDE / SIDE/ WAY     (FT)    (FT}  (FT}   (FT)    (n}

  1   30.0     20.0    0 .018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   16.0     11.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)* (Velocity) Constraint =  6.0  (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

************************************************************************
  FLOW PROCESS FROM NODE  14001.00 TO NODE  14002.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==================== ========================== = ;=========================
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
```

```
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.02(MIN.)
  INITIAL SUBAREA FLOW-LENGTH{FEET) =   123.00
  UPSTREAM ELEVATION(FEET) =    585.00
  DOWNSTREAM ELEVATION(FEET) =    579.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.016
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.953
  SUBAREA RUNOFF(CFS)        0.84
  TOTAL AREA(ACRES)  =      0.20   TOTAL RUNOFF(CFS)        0.84

****************************************************************************
  FLOW PROCESS FROM NODE  14002.00 TO NODE  14003.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<
================ = =   =2 s=:=  =;   ====================================
  ELEVATION DATA: UPSTREAM(FEET) =   579.00  DOWNSTREAM {FEET)     562.10
  FLOW LENGTH{FEET) =  1600.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      3.51
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       0.84
  PIPE TRAVEL  TIME(MIN.)  =   7.60    Tc(MIN.)  =   14.62
  LONGEST FLOWPATH FROM NODE  14001.00  TO NODE  14003.00    1723.00  FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  14003.00 TO NODE  14003.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.869
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .8500
  S.C.S. CURVE NUMBER  (AMC II) =    0
  SUBAREA  AREA(ACRES)   13.60   SUBAREA  RUN'OFF(CFS)     33.16
  TOTAL   AREA(ACRES)   13.80   TOTAL   RUNOFF{CFS)   =   34.00
  TC(MIN.) =  14.62

****************************************************************************
  FLOW PROCESS FROM NODE  14003.00 TO NODE  14004.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
==========  ==========  =======-======= ================;======= ===     ;= ===
  ELEVATION DATA: UPSTREAM(FEET) =   559.20  DOWNSTREAM(FEET)      556.BO
  FLOW LENGTH(FEET) =    21.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)    22.31
  ESTIMATED PIPE DIAMETER {INCH) =  21.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     34.00
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc {MIN.) =  14.63
  LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14004.00    1744.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  14004.00 TO NODE  14004.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  ;==================   ====================== ==============================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)    14.63
  RAINFALL INTENSITY(INCH/HR)     2.87
  TOTAL STREAM AREA(ACRES)  =    13.80
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     34.00

****************************************************************************
  FLOW PROCESS FROM NODE  14005.00 TO NODE  14006.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.80(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    565.90
  DOWNSTREAM ELEVATION(FEET) =    564.60
  ELEVATION DIFFERENCE(FEET) =      1.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.799
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.044
  SUBAREA RUNOFF(CFS)        0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.45

****************************************************************************
  FLOW PROCESS FROM NODE  14006.00 TO NODE  14004.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  564.60  DOWNSTREAM ELEVATION(FEET)    562.00
  STREET LENGTH(FEET) =   143.60   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)"     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         0.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) = 0.22
    HALFSTREET FLOOD WIDTH(FEET) =    5.99
    AVERAGE FLOW VELOCITY(FEET/SEC.)      1.94
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.44
  STREET FLOW TRAVEL TIME(MIN.) =   1.24   Tc(MIN.)     8.03
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    4.525
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)       0.20      SUBAREA RUNOFF(CFS}       0.81
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS)         1.27

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET)     7.19
  FLOW VELOCITY(FEET/SEC. ) =  2.10   DEPTH*VELOCITY(FT*FT/SEC.)       0.52
  LONGEST FLOWPATH FROM NODE  14005.00 TO NODE  14004.00 =   203.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  14004.00 TO NODE  14004.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================    ========== ===
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.03
```

```
 RAINFALL INTENSITY(INCH/HR) =   4.53
 TOTAL STREAM AREA(ACRES) =    0.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.27

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1       34.00     14.63         2.866          13.80
     2        1.27      8.03         4.525           0.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF       Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1       22.80      8.03         4.525
     2       34.81     14.63         2.866

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)       34.81   Tc(MIN.) =    14.63
 TOTAL AREA(ACRES) =       14.10
 LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14004.00    1744.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  14004.00 TO  NODE  14007.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================= ;================================================;    =
 ELEVATION  DATA : UPSTREAM(FEET) =    556.50  DOWNSTREAM(FEET)       556.10
 FLOW LENGTH(FEET) =      4.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.97
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =      34.81
 PIPE TRAVEL TIME(MIN.) =    0.00    Tc(MIN.) =  14.64
 LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14007.00    1749.10 FEET.

**********************************  ***************** ************************
 FLOW PROCESS FROM NODE  14007.00 TO NODE  14008.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========== ========== ========== ========== ================== ===============
 ELEVATION DATA: UPSTREAM(FEET) =    555.80  DOWNSTREAM(FEET)      547.20
 FLOW LENGTH(FEET) =   286.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)       13.45
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      34.81
 PIPE TRAVEL TIME(MIN.) =    0.36    Tc(MIN.) =   14.99
 LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14008.00    2035.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  14008.00 TO NODE  14009.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============ a====•za;================== ==•=a====================
 ELEVATION DATA: UPSTREAM(FEET) =    546.80  DOWNSTREAM(FEET)538.00  FLOW
 LENGTH(FEET) =        296.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)       13.39
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =      34.81
 PIPE TRAVEL TIME(MIN.) =    0.37    Tc(MIN.) =  15.36
 LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14009.00    2331.80 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE  14009.00 TO NODE  14009.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 ============ ======================  ====== ================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     15.36
  RAINFALL INTENSITY(INCH/HR) =   2.77
  TOTAL STREAM AREA(ACRES) =    14.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     34.81

****************************************************************************
  FLOW PROCESS FROM NODE  14010.00 TO NODE  14011.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.79(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.20
  UPSTREAM ELEVATION(FEET) =    563.00
  DOWNSTREAM ELEVATION(FEET) =    561.30
  ELEVATION DIFFERENCE(FEET) =      1.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.793
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    SO YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.047
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.45

 '****************************************************************************
  FLOW PROCESS FROM NODE  14011.00 TO NODE  14012.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
= ========  =====  = ====  ==  ======================  ================  =============
  UPSTREAM ELEVATION(FEET) =  561.30  DOWNSTREAM ELEVATION(FEET)    546.30
  STREET LENGTH(FEET) =   546.50   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL(DECIMAL)    0.020
  OUTSIDE  STREET CROSSFALL(DECIMAL)     0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
  STREET PARKWAY CROSSFALL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
  Manning's FRICTION FACTOR for Back-of-Walk  Flow Section     0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    8.31
    AVERAGE FLOW VELOCITY(FEET/SEC.)      2.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.74
  STREET FLOW TRAVEL TIME(MIN.)     3.32   Tc(MIN.)     10.11
    50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.679
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER  (AMC II) =   0
  SUBAREA AREA(ACRES) •    1.00      SUBAREA RUNOFF(CFS)      3.31
  TOTAL AREA(ACRES) =      1.10        PEAK FLOW RATE(CFS)         3.77

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.54
 FLOW VELOCITY(FEET/SEC.) =  3.14   DEPTH*VELOCITY(FT*FT/SEC.)      0.99
 LONGEST FLOWPATH FROM NODE  14010.00 TO NODE  14012.00 =   611.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  14012.00  TO  NODE  14009.00 IS CODE =   31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======; ======================== == ======================= m= ============
 ELEVATION DATA: UPSTREAM(FEET) =   538.40   DOWNSTREAM(FEET)      538.00
 FLOW LENGTH(FEET) =     4.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE rS   4.3 INCHES
 PIPE-FLOW VELOCITY( FEET/SEC.)    11.71
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       3.77
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =  10.12
 LONGEST FLOWPATH FROM NODE  14010.00 TO NODE  14009.00     616.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  14009.00  TO  NODE  14009.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================      =
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)    10.12
 RAINFALL INTENSITY(INCH/HR) =   3.68
 TOTAL STREAM AREA(ACRES) =      1.10
 PEAK FLOW RATE{CFS) AT CONFLUENCE =     3.77

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   {INCH/HOUR)    {ACRE)
     1       34.81    15.36        2.771         14.10
     2        3.77    10.12        3.678          1.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
     1       29.99    10.12       3.678
     2       37.64    15.36       2.771

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     37.64   Tc(MIN.) =   15.36
 TOTAL AREA(ACRES) =     15.20
 LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14009.00    2331.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  14009.00  TO  NODE  14013.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============== ==========================;==========  ======a=== ====  ========
 ELEVATION DATA: UPSTREAM(FEET) =   537.50   DOWNSTREAM{FEET)     528.60
 FLOW LENGTH(FEET) =   296.00    MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    14.02
 ESTIMATED PIPE DIAMETER(INCH)2  27.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     37.64
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =  15.71
 LONGEST FLOWPATH FROM NODE  14001.00 TO NODE . 14013.00    2627.80 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE  14013.00 TO NODE  14014.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<
 == ======== =  = ================================================
  ELEVATION DATA: UPSTREAM(FEET) =   528.30  DOWNSTREAM(FEET)      519.40
  FLOW LENGTH(FEET) =   296.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        14.02
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      37.64
  PIPE TRAVEL TIME(MIN.) =    0.35    Tc(MIN.) =  16.07
  LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14014.00    2923.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  14014.00 TO NODE  14014.00 IS CODE =   1

  >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE<<<<<
===========  === ====================================;======================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     16.07
  RAINFALL  INTENSITY(INCH/HR)  =    2.71
  TOTAL STREAM AREA(ACRES)  =     15.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.64

****************************************************************************
  FLOW PROCESS FROM NODE  14015.00 TO NODE  14016.00 IS CODE    21

  >>>>>RATIONAL  METHOD  INITIAL  SUBAREA  ANALYSIS<<<<<
=============================================================-============
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.96(MIN.)
  INITIAL  SUBAREA  FLOW-LENGTH(FEET)  =     94.10
  UPSTREAM ELEVATION(FEET) =     547.10
  DOWNSTREAM  ELEVATION(FEET)  =     544.00
  ELEVATION DIFFERENCE(FEET) =       3.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)       6.962
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.976
  SUBAREA RUNOFF(CFS)         0.45
  TOTAL AREA(ACRES)  =       0.10   TOTAL RUNOFF(CFS)         0.45

****************************************************************************
  FLOW  PROCESS  FROM  NODE  14016.00  TO  NODE  14017.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
== = = ==;================================== ===== = === ======================
  UPSTREAM ELEVATION(FEET) =  544.00  DOWNSTREAM ELEVATION(FEET)     527.10
  STREET LENGTH(FEET) =   525.90   CURB HEIGHT{INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)     11.00
  INSIDE STREET CROSSFALL(DECIMAL)     0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)      0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
  STREET PARKWAY CROSSFALL(DECIMAL)      0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =    0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section      0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.69
```

```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET} =  0.28
     HALFSTREET FLOOD WIDTH(FEET) =    8.91
     AVERAGE FLOW VELOCITY(FEET/SEC.) =3.06
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.87
   STREET FLOW TRAVEL TIME(MIN.) =   2.87   Tc(MIN.)     9.83
     50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.772
   *USER SPECIFIED(SUBAREA):
   INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   S.C.S. CURVE NUMBER  (AMC II) =   0
   SUBAREA AREA(ACRES)      1.30      SUBAREA RUNOFF(CFS)      4.41
   TOTAL AREA(ACRES) =      1.40        PEAK FLOW RATE(CFS)         4.86

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET)    11.32
   FLOW VELOCITY(FEET/SEC.) =  3.56   DEPTH*VELOCITY(FT*FT/SEC.)      1.18
   LONGEST FLOWPATH FROM NODE  14015.00 TO NODE  14017.00 =   620.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  14017.00 TO NODE  14014.00 IS CODE =  31

   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===============   ===============; ========================  = ;= ========
   ELEVATION DATA: UPSTREAM(FEET) =   520.30  DOWNSTREAM(FEET)      519.90
   FLOW LENGTH(FEET) =     4.30   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.)    12.61
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
   PIPE-FLOW(CFS) =      4.86
   PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   9.83
   LONGEST FLOWPATH FROM NODE  14015.00 TO NODE  14014.00     624.30 FEET.

   ****************************************************************************
   FLOW PROCESS FROM NODE  14014.00 TO NODE  14014.00 IS CODE =   1
--    .      '.    .    --        -  -    --        .  .    -  -  ----------

   ---- ------- ---- ----  -------- -- ----  -------- -- ---- -- --
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
   >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==: ===Z==========;================================== ===== ========== =====
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
   TIME OF CONCENTRATION(MIN.)      9.83
   RAINFALL INTENSITY(INCH/HR) =    3.77
   TOTAL STREAM AREA(ACRES) =      1.40
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.86

   ** CONFLUENCE DATA **
   STREAM      RUNOFF       Tc       INTENSITY      AREA
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1       37.64     16.07         2.715          15.20
       2        4.86      9.83         3.770           1.40

   RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
   CONFLUENCE FORMULA USED FOR  2 STREAMS.

   ** PEAK FLOW RATE TABLE **
   STREAM      RUNOFF       Tc       INTENSITY
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
       1       31.97      9.83         3.770
       2       41.15     16.07         2.715

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS)        41.15   Tc(MIN.) =   16.07
   TOTAL AREA(ACRES) =      16.60
   LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14014.00 =  2923.80 FEET.

 ****************************************************************************
```

```
 FLOW PROCESS FROM NODE  14014.00 TO NODE  14018.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   519.00  DOWNSTREAM(FEET)     515.10
 FLOW LENGTH(FEET) =   113.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        15.06
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     41.15
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  16.19
 LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14018.00    3037.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  14018.00 TO NODE  14018.00 IS CODE =  10

 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==;;=====================  ======================;============  ==========

****************************************************************************
 FLOW PROCESS FROM NODE  14019.00 TO NODE  14020.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========  ==  ====;======;======  ==============  =================   =  =========
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.09(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.60
 UPSTREAM ELEVATION(FEET) =    537.40
 DOWNSTREAM ELEVATION(FEET) =    536.00
 ELEVATION DIFFERENCE(FEET) =      1.40
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.092
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.921
 SUBAREA RUNOFF(CFS)        0.44
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.44

****************************************************************************
 FLOW PROCESS FROM NODE  14020.00 TO NODE  14021.00 IS CODE =  62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
=========  =================================;      ========================
 UPSTREAM ELEVATION(FEET) =  536.00  DOWNSTREAM                    522.70
 ELEVATION(FEET) STREET LENGTH(FEET) =                  764.00
                        CURB HEIGHT(INCHES) =           6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)    0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         3.51
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.23
   AVERAGE FLOW VELOCITY(FEET/SEC.)      2.60
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
 STREET FLOW TRAVEL TIME(MIN.) =   4.89   Tc(MIN.)    11.98
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.343
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT =  .9000
```

```
  S.C.S. CURVE NUMBER  (AMC II) =    0
  SUBAREA A.REA{ACRES)       2.00      SUBAREA RUNOFF{CFS) =     6.02
  TOTAL AREA(ACRES) =        2.10        PEAK FLOW RATE(CFS)          6.46

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH{FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET)     14.32
  FLOW VELOCITY{FEET/SEC.) =  3.02   DEPTH*VELOCITY(FT*FT/SEC.)      1.18
  LONGEST FLOWPATH FROM NODE  14019.00 TO NODE  14021.00 =    844.60  FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  14021.00 TO NODE  14022.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE {NON-PRESSURE FLOW)<<<<<
======= ============================ ==== ====== ==========================
  ELEVATION DATA: UPSTREAM{FEET) =    518.00  DOWNSTREAM(FEET)      516.70
  FLOW LENGTH{FEET) =     65.30   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER{INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY{FEET/SEC.)      7.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =       6.46
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc{MIN.) =  12.12
  LONGEST FLOWPATH FROM NODE  14019.00 TO NODE  14022.00     909.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  14022.00 TO NODE  14022.00 IS CODE =   1

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============= ==   =========  ======;===================================
  TOTAL NUMBER OF STREAMS = 2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.)     12.12
  RAINFALL INTENSITY(INCH/HR) =   3.32
  TOTAL STREAM AREA(ACRES) =      2.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.46

****************************************************************************
  FLOW PROCESS FROM NODE  14023.00 TO NODE  14024.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL BUBA.REA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA) :
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER  (AMC II) =    0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.05(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    78.20
  UPSTREAM ELEVATION(FEET) =    537.40
  DOWNSTREAM ELEVATION{FEET) =    536.00
  ELEVATION DIFFERENCE(FEET) =      1.40
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.054
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.937
  SUBAREA RUNOFF{CFS)        0.44
  TOTAL AREA{ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.44

****************************************************************************
  FLOW PROCESS FROM NODE  14024.00 TO NODE  14025.00 IS CODE =  62

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
== ================================ ============ ========== ============ =
  UPSTREAM ELEVATION(FEET) =  536.00  DOWNSTREAM ELEVATION(FEET)     522.70
  STREET LENGTH(FEET) =   767.60   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
  INSIDE STREET CROSSFALL{DECIMAL)    0.020
```

```
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.39
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.30
   HALFSTREET FLOOD WIDTH(FEET) =    9.60
   AVERAGE FLOW VELOCITY(FEET/SEC.)       2.37
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.70
 STREET FLOW TRAVEL TIME(MIN.) =    5.39    Tc(MIN.)     12.45
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.259
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =    0
 SUBAREA AREA(ACRES)       1.30      SUBAREA RUNOFF(CFS)       3.81
 TOTAL AREA(ACRES) =       1.40        PEAK FLOW RATE(CFS)          4.26

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET)     12.lB
 FLOW VELOCITY(FEET/SEC.) =  2.71    DEPTH*VELOCITY( FT*FT/SEC .)     0.95
 LONGEST FLOWPATH FROM NODE  14023.00 TO NODE  14025.00 =    845.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  14025.00 TO NODE  14022.00 IS CODE =  31

 >>>>>COMPUTE  PIPE-FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   517.00  DOWNSTREAM(FEET) =   516.70
 FLOW LENGTH(FEET) =     3.30   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS4.6 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.)    12.03
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =       4.26
 PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =  12.45
 LONGEST FLOWPATH FROM NODE  14023.00 TO NODE  14022.00     849.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  14022.00 TO NODE  14022.00 IS CODE =   1

 >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================  ====  ==; =;=================== ===
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)     12.45
 RAINFALL INTENSITY(INCH/HR) =   3.26
 TOTAL STREAM AREA (ACRES) =     1.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.26

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        6.46    12.12        3.318          2.10
     2        4.26    12.45        3.259          1.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
     1       10.64    12.12        3.318
```

```
     2       10.60     12.45       3.259

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)        10.64    Tc(MIN.) =    12.12
  TOTAL AREA(ACRES) =        3.50
  LONGEST FLOWPATH FROM NODE  14019.00 TO NODE  14022.00      909.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  14022.00 TO NODE  14018.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ========== =========  ==============================  ========================
  ELEVATION DATA: UPSTREAM(FEET) =    516.30  DOWNSTREAM(FEET)      515.10
  FLOW LENGTH(FEET) =     75.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)      7.97
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     10.64
  PIPE TRAVEL TIME(MIN.) =    0.16    Tc(MIN.) =  12.28
  LONGEST FLOWPATH FROM NODE  14019.00 TO NODE  14018.00      985.50 FEET.

 ****************************************************************************
  FLOW PROCESS FROM NODE  14018.00 TO NODE  14018.00 IS CODE =  11

  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<


  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1       10.64     12.28        3.289         3.50
  LONGEST FLOWPATH FROM NODE  14019.00 TO NODE  14018.00      985.50 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM      RUNOFF      Tc      INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1       41.15     16.19        2.705        16.60
  LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14018.00     3037.10 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF        Tc       INTENSITY
  NUMBER      (CFS)      (MIN.)   (INCH/HOUR)
      1       44.48      12.28    3.289
      2       49.90      16.19        2.705

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)        49.90   Tc(MIN.) =    16.19
  TOTAL AREA(ACRES) =      20.10

 ****************************************************************************
  FLOW PROCESS FROM NODE  14018.00 TO NODE  14026.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================== =======;======================== ===  ===== ====
  ELEVATION DATA: UPSTREAM(FEET) =    514.80  DOWNSTREAM(FEET)      514.40
  FLOW LENGTH(FEET) =     73.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        7.85
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     49.90
  PIPE TRAVEL TIME(MIN.) =    0.16    Tc(MIN.) =  16.35
  LONGEST FLOWPATH FROM NODE  14001.00 TO NODE  14026.00     3110.40 FEET.
== ============================== ============================  ========= ====
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)           20.10  TC(MIN. ) =      16.35
  PEAK FLOW RATE(CFS)         49.90
```

END OF RATIONAL METHOD ANALYSIS

APPENDIX C

100-Year Rational Method Results for the Post-Project Condition

3027

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. l.5A Release Date: 01/01/2003 License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707    Fax 619-291-4165

 ********************** DESCRIPTION OF STUDY *************** ********* *
* McMILLIN OTAY RANCH, VILLAGE 7                                         *
* 100-YEAR STORM EVENT FOR BASIN 3000                                    *
* JN-14531A NOVEMBER 10, 2004                                            *
 ********************************************************   ************ **

  FILE NAME: C:\aes2003\hydrosft\ratscx\3000b.DATULLJULIUUOC::fl:"ll:lfl
  TIME/DATE OF STUDY: 14:08 11/10/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  1985 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  SAN DIEGO HYDROLOGY MANUAL "C''-VALUES USED FOR RATIONAL METHOD
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO  STREET-CROSSFALL:  CURB  GUTTER-GEOMETRI ES:  MANNING
     WIDTH   CROSSFALL  IN- / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)

  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.12 FEET
       as (Maximum Allowable Street Flow Depth)   (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

************************** ************************** ********** ******* *****
  FLOW PROCESS FROM NODE   3024.00 TO NODE   3024.00 IS CODE =   7

  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
= ================================= ======================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.18   RAIN INTENSITY(INCH/HOUR) = 4.16
  TOTAL AREA(ACRES) =    11.00   TOTAL RUNOFF(CFS) =     30.40
```

```
**************************************************************************** ******
  FLOW PROCESS FROM NODE   3024.00 TO NODE   3025.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   523.40  DOWNSTREAM(FEET)      519.00
  FLOW LENGTH(FEET) =   293.27   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     10.16
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     30.40
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =  10.66
  LONGEST FLOWPATH FROM NOOE      0.00 TO NODE   3025.00     293.27 FEET.

********************  ************ ************ ***************** *************
  FLOW PROCESS FROM NODE   3025.00 TO NODE   3026.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===   ================================  ====================================
  ELEVATION DATA: UPSTREAM(FEET) =   518.70  DOWNSTREAM(FEET )     507.20
  FLOW LENGTH(FEET) =   249.40   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        15.27
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     30.40
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =  10.93
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE   3026.00     542.67 FEET.

********************  ********************************************** ******
  FLOW PROCESS FROM NODE   3026.00 TO NODE   3027.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   506.90  DOWNSTREAM(FEET)     498.10
  FLOW LENGTH(FEET) =   226.87   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)    14.66
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     30.40
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =  11.19
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE   3027.00     769.54 FEET.

**************************************************************************** ********
  FLOW PROCESS FROM NODE   3027.00 TO NODE   3027.00 IS CODE =  10

  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========================================================================  ========

**********************************************  ************************
  FLOW PROCESS FROM NODE   3030.00 TO NODE   3029.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================  =============  ===================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   6.83(MIN.)
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    54.90
 UPSTREAM ELEVATION(FEET) =    531.80
 DOWNSTREAM ELEVATION(FEET) =    530.90
 ELEVATION DIFFERENCE(FEET) =      0.90
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.831
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.386
 SUBAREA RUNOFF(CFS)        0.40
 TOTAL AREA{ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.40

******.********************************** **** ********************************

 FLOW PROCESS FROM NODE   3029.00 TO NODE   3028.00 IS CODE =  61

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================    ========================
 UPSTREAM ELEVATION(FEET) =  530.90  DOWNSTREAM ELEVATION(FEET)    509.10
 STREET LENGTH(FEET) =   697.80   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH{FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    11.00
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL )     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)        1.45
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    6.50
   AVERAGE FLOW VELOCITY(FEET/SEC.)      2.67
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.68
 STREET FLOW TRAVEL TIME(MIN.) =   4.35   Tc(MIN.)    11.19
  100 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.919
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)      0.70      SUBAREA RUNOFF(CFS)      2.06
 TOTAL AREA(ACRES) =      0.80        PEAK FLOW RATE(CFSl          2.46

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIOTH(FEET)     8.39
 FLOW VELOCITY(FEET/SEC.) =  2.99   DEPTH*VELOCITY(FT*FT/SEC.)     0.88
 LONGEST FLOWPATH FROM NODE   3030.00 TO NODE   3028.00 =   752.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3028.00 TO NODE   3028.00 IS CODE     1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========  ==========================================C=========================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)    11.19
 RAINFALL INTENSITY(INCH/HR) =   3.92
 TOTAL STREAM AREA(ACRES) =     0.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.46

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

 FLOW PROCESS FROM NODE   3032.00 TO NODE   3031.00 IS CODE =  21
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 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) = 0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH 6-MIN. ADDED = 7.26(MIN.)
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 123.90
 UPSTREAM ELEVATION(FEET) = 540.70
 DOWNSTREAM ELEVATION(FEET) = 537.20
 ELEVATION DIFFERENCE(FEET) = 3.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) 7.261
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.178
 SUBAREA RUNOFF(CFS) 0.39
 TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) 0.39

**************** ************* *********** *********** ************* ********
 FLOW PROCESS FROM NODE 3031.00 TO NODE 3028.00 IS CODE = 61

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<

 UPSTREAM ELEVATION(FEET) = 537.20 DOWNSTREAM ELEVATION(FEET) 509.10
 STREET LENGTH(FEET) = 930.90 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) 11.00
 INSIDE STREET CROSSFALL(DECIMAL) 0.020
 OUTSIDE STREET CROSSFALL(DECIMAL) 0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF 1
 STREET PARKWAY CROSSFALL(DECIMAL) 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) 0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section 0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) 2.33
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) = 0.29
   HALFSTREET FLOOD WIDTH(FEET) = 8.22
   AVERAGE FLOW VELOCITY(FEET/SEC.) 2.94
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) 0.85
 STREET FLOW TRAVEL TIME(MIN.) = 5.28 Tc(MIN.) 12.54
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) 3.639
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) = 0
 SUBAREA AREA(ACRES) 1.40 SUBAREA RUNOFF(CFS) 3.82
 TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) 4.21

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) 10.63
 FLOW VELOCITY(FEET/SEC.) = 3.37 DEPTH*VELOCITY(FT*FT/SEC.) 1.14
 LONGEST FLOWPATH FROM NODE 3032.00 TO NODE 3028.00 = 1054.80 FEET.

********************** ************************************ ************** ****
 FLOW PROCESS FROM NODE 3028.00 TO NODE 3028.00 IS CODE = 1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
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  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================   =========
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION (MIN.)     12.54
  RAINFALL  INTENSITY(INCH/HR)  =   3.64
  TOTAL  STREAM  AREA(ACRES)  =     1.50
  PEAK  FLOW  RATE(CFS)  AT  CONFLUENCE  =      4.21

  ** CONFLUENCE  DATA **
  STREAM     RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1         2.46    11.19         3.919          0.80
      2         4.21    12.54         3.639          1.50

  RAINFALL  INTENSITY  AND  TIME  OF  CONCENTRATION  RATIO
  CONFLUENCE  FORMULA  USED  FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
      1         6.37    11.19        3.919
      2         6.50    12.54        3.639

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK  FLOW  RATE(CFS)         6.50   Tc(MIN. ) =   12.54
  TOTAL AREA(ACRES)  =       2.30
  LONGEST  FLOWPATH  FROM  NODE   3032.00 TO NODE   3028.00    1054.80  FEET.

******************* ******* ************************* ************************
  FLOW  PROCESS  FROM  NODE   3028.00 TO NODE   3027.00  IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<

  ELEVATION  DATA:  UPSTREAM(FEET)  =   499.50  DOWNSTREAM( FEET)     498.60
  FLOW  LENGTH(FEET)  =    46.25   MANNING'S  N  =  0.013
  ESTIMATED  PIPE  DIAMETER(INCH)  INCREASED  TO  18.000
  DEPTH  OF  FLOW  IN  18.0 INCH PIPE IS8.6 INCHES
  PIPE-FLOW  VELOCITY(FEET/SEC.)      7.74
  ESTIMATED  PIPE  DIAMETER(INCH)  =  18.00    NUMBER OF PIPES    1
  PIPE-FLOW(CFS) =       6.50
  PIPE  TRAVEL  TIME(MIN. ) =   0.10    Tc(MIN. ) =  12.64
  LONGEST  FLOWPATH  FROM  NODE   3032.00 TO NODE   3027.00    1101.05  FEET.

*  ***  ***************************************************  **********
  FLOW  PROCESS  FROM  NODE   3027.00 TO NODE   3027.00  IS CODE =  10

  >>>>>MAIN-STREAM  MEMORY  COPIED  ONTO  MEMORY  BANK  # 2 <<<<<


************************  ***************  *********************************
  FLOW  PROCESS  FROM  NODE   3035.00 TO NODE   3034.00 rs CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(SUBAREA):
  SINGLE  FAMILY  DEVELOPMENT  RUNOFF  COEFFICIENT  =  .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.07(MIN.)
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 INITIAL SUBAREA FLOW-LENGTH(FEET) =    59.70
 UPSTREAM ELEVATION(FEET) =     525.30
 DOWNSTREAM ELEVATION(FEET) =  524.70
 ELEVATION DIFFERENCE(FEET) =     0.60
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)       7.070
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.268
 SUBAREA RUNOFF(CFS)         0.40
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)         0.40

******* ************************* ************************************* *****
 FLOW PROCESS FROM NODE   3034.00 TO NODE   3033.00 IS CODE =  61

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<

 UPSTREAM ELEVATION(FEET) =  524.70  DOWNSTREAM ELEVATION(FEET)     509.10
 STREET LENGTH(FEET) =  1135.40   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)     11.00
 INSIDE STREET CROSSFALL(DECIMAL)     0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)      0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
 STREET PARKWAY CROSSFALL(DECIMAL)      0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)          2.21
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =     9.60
   AVERAGE FLOW VELOCITY(FEET/SEC.)       2.13
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       0.68
 STREET FLOW TRAVEL TIME(MIN.) =   8.88   Tc(MIN.)    15.95
  100 YEAR RAINFALL INTENSITY(INCH/HOUR)     3.117
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)       1.50      SUBAREA RUNOFF(CFS)       3.51
 TOTAL AREA(ACRES) =       1.60        PEAK FLOW RATE(CFS)          3.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET)     12.18
 FLOW VELOCITY(FEET/SEC.) =  2.44   DEPTH*VELOCITY(FT*FT/SEC.)     0.90
 LONGEST FLOWPATH FROM NODE   3035.00 TO NODE   3033.00 =  1195.10 FEET.

****************************************  ******** * ****** ****************
 FLOW PROCESS FROM NODE   3033.00 TO NODE   3033.00 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)    15.95
 RAINFALL INTENSITY(INCH/HR) =   3.12
 TOTAL STREAM AREA(ACRES) =     1.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.90

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 FLOW PROCESS FROM NODE   3037.00 TO NODE   3036.00 IS CODE =  21
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>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

*USER  SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
S.C.S. CURVE NUMBER (AMC II) =   0
URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
TIME OF CONCENTRATION WITH  6-MIN. ADDED =   7.5l(MIN.)
INITIAL SUBAREA FLOW-LENGTH(FEET) =    63.70
UPSTREAM ELEVATION(FEET) =    542.10
DOWNSTREAM ELEVATION(FEET) =    541.80
ELEVATION DIFFERENCE(FEET) =      0.30
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      7.506
*CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
 DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.069
SUBAREA RUNOFF(CFS)        0.38
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS)        0.38

****************************************************************    *** ***
FLOW PROCESS FROM NODE   3036.00 TO NODE   3033.00 IS CODE =  61

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<

UPSTREAM ELEVATION(FEET) =  541.80  DOWNSTREAM ELEVATION(FEET)    509.00
STREET LENGTH(FEET) =   987.30   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 25.50

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)    20.50
INSIDE STREET CROSSFALL(DECIMAL)    0.020
OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF    1
STREET PARKWAY CROSSFALL(DECIMAL)     0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0180
Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.29
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.29
  HALFSTREET FLOOD WIDTH(FEET) =    8.00
  AVERAGE FLOW VELOCITY(FEET/SEC.)      3.02
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      0.86
STREET FLOW TRAVEL TIME(MIN.) =   5.46   Tc(MIN.)    12.96
 100 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.563
*USER  SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT =  .7500
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES)      1.40      SUBAREA RUNOFF(CFS)      3.74
TOTAL AREA(ACRES) =      1.50        PEAK FLOW RATE{CFS)         4.12

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET)    10.33
FLOW VELOCITY(FEET/SEC.) =  3.48   DEPTH*VELOCITY(FT*FT/SEC.)      1.16
LONGEST FLOWPATH FROM NODE   3037.00 TO NODE   3033.00 =  1051.00 FEET.

********************  ************************************************    W *
FLOW PROCESS FROM NODE   3033.00 TO NODE   3033.00 IS CODE =

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
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  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================ ========== ==============================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)     12.96
  RAINFALL INTENSITY(INCH/HR) =   3.56
  TOTAL STREAM AREA(ACRES) =      1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.12

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
      1         3.90     15.95         3.117          1.60
      2         4.12     12.96         3.563          1.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1         7.53     12.96         3.563
      2         7.51     15.95         3.117

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)         7.53   Tc(MIN.) =   12.96
  TOTAL AREA(ACRES) =      3.10
  LONGEST FLOWPATH FROM NODE   3035.00 TO NODE   3033.00    1195.10 FEET.

**********************************  ****************************** *************
  FLOW PROCESS FROM NODE   3033.00 TO NODE   3027.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   499.00  DOWNSTREAM(FEET)     498.60
  FLOW LENGTH(FEET) =     4.25   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     14.33
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      7.53
  PIPE TRAVEL TIME(MIN.)=   0.00    Tc(MIN.)=  12.97
  LONGEST FLOWPATH FROM NODE   3035.00 TO NODE   3027.00    1199.35  FEET.

****************************************************    ************** ******
  FLOW PROCESS FROM NODE   3027.00 TO NODE   3027.00 IS CODE =  11

  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
      1         7.53     12.97         3.562          3.10
  LONGEST FLOWPATH FROM NODE   3035.00 TO NODE   3027.00    1199.35 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
      1         6.50     12.64         3.621          2.30
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 LONGEST FLOWPATH FROM NODE   3032.00 TO NODE   3027.00    1101.05 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     13.91      12.64        3.621
     2     13.93      12.97        3.562

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)       13.93   Tc(MIN. ) =   12.97
 TOTAL AREA(ACRES) =      5.40

************************************  * ***************  ***** *** * * ** ******** *
 FLOW PROCESS FROM NODE   3027.00 TO NODE   3027.00 IS CODE =  12

 >>>>>CLEAR MEMORY BANK # 2 <<<<<


*  *******   *  ************************************************************************
 FLOW PROCESS FROM NODE   3027.00 TO NODE   3027.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<


 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF     Tc       INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1       13.93     12.97        3.562        5.40
 LONGEST FLOWPATH FROM NODE   3035.00 TO NODE   3027.00    1199.35 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      l\REA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1       30.40     11.19        3.917       11.00
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE   3027.00     769.54 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     43.06      11.19        3.917
     2     41.57      12.97        3.562

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)       43.06   Tc(MIN.) =   11.19
 TOTAL AREA(ACRES) =     16.40

************************************  * ******************** ******** *******
 FLOW PROCESS FROM NODE   3027.00 TO NODE   3027.00 IS CODE =  12

 >>>>>CLEAR MEMORY BANK # 1 <<<<<


*********************************************  *************** *** *** ****
 FLOW PROCESS FROM NODE   3027.00 TO NODE   3038.00 IS CODE =  31

 »»»COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >> >>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE FLOW)<<<<<
=========================================================================
 ELEVATION  DATA: UPSTREAM(FEET) =   497.70  DOWNSTREAM(FEET)      496.70
 FLOW LENGTH(FEET)      78.27   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.0 INCHES
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PIPE-FLOW  VELOCITY( FEET/SEC.)     10.23
ESTIMATED PIPE DIAMETER(INCH)     30.00     NUMBER  OF  PIPES      1
PIPE-FLOW(CFS) =     43.06
PIPE TRAVEL TIME(MIN.) =    0.13     Tc(MIN. ) =  11.32
LONGEST  FLOWPATH  FROM  NODE    3035.00 TO NODE    3038.00     1277.62  FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES)            16.40  TC(MIN.) =      11.32
PEAK  FLOW  RATE(CFS)        43.06


END  OF  RATIONAL  METHOD  ANALYSIS
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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2003 Advanced Engineering Software (aes)
Ver. l.SA Release Date: 01/01/2003 License ID 1261

Analysis prepared by:

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619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********
* McMILLIN OTAY RANCH, VILLAGE 7 *
* 100-YEAR STORM EVENT FOR BASIN 3000 *
* JN-14531A NOVEMBER 10, 2004 *
****

FILE NAME: C:\aes2003\hydrosft\ratscx\3000c.DAT
TIME/DATE OF STUDY: 07:53 11/10/2004

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

1985 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.500
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE 0.90
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.
(BASED ON 07/1998 ADOPTED MANUAL)
NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK-SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
2	20.0	15.0	0.020/0.020/0.020	0.50	1.50	0.0100	0.125	0.0180

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = -0.12 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

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FLOW PROCESS FROM NODE 10000.00 TO NODE 10001.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
S.C.S. CURVE NUMBER (AMC II) = 0
URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)

```
 TIME OF CONCENTRATION WITH  6-MIN. ADDED =
 6.99(MIN.) INITIAL SUBAREA FLOW-LENGTH(FEET) =
                            170.60
 UPSTREAM ELEVATION(FEET) =    540.00
 DOWNSTREAM ELEVATION(FEET) =    523.00
 ELEVATION DIFFERENCE(FEET) =     17.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.)      6.993
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.305
 SUBAREA RUNOFF(CFS)        1.59
 TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS)        1.59

******* ************************************************************k   **********
 FLOW PROCESS FROM NODE  10001.00 TO NODE  10002.00 IS CODE =  51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 »>»TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<«<

 ELEVATION DATA: UPSTREAM(FEET) =    523.00  DOWNSTREAM(FEET)      508.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   234.     CHANNEL SLOPE    0.0640
 CHANNEL BASE(FEET)      2.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.002
 *USER SPECIFIED(SUBAREA):
 SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)        7.22
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)     5.84
 AVERAGE FLOW DEPTH(FEET)  0. 43  TRAVEL TIME(MIN.)     0.67
 Tc(MIN.) =   7.66
 SUBAREA AREA(ACRES)       3.00       SUBAREA RUNOFF(CfS)     11.25
 TOTAL AREA(ACRES) =      3.40         PEAK FLOW RATE(CFS)        12.85

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.59   FLOW VELOCITY(FEET/SEC.)     6.84
 LONGEST FLOWPATH FROM NODE  10000.00 TO NODE  10002.00 =   405.00 tEET.

*************** ************************************  * ******************  ***
 FLOW PROCESS FROM NODE  10002.00 TO NODE   3040.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   508.00  DOWNSTREAM(FEET)     503.40
 FLOW LENGTH(FEET) =    98.87   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    12.71
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     12.85
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   7.79
 LONGEST FLOWPATH FROM NODE  10000.00 TO NODE   3040.00     503.87 FEET.

*** ************************ ********************  ******* ********************
 FLOW PROCESS FROM NODE   3040.00 TO NODE   3038.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======== ============================================================   ===
 ELEVATION DATA: UPSTREAM(FEET)     503.10  DOWNSTREAM(FEET)      497.50
 FLOW LENGTH(FEET) =  131.66   MANNING'S N =  0.013
```

```
DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
PIPE-FLOW VELOCITY( FEET/SEC. )         12.28
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES     1
PIPE-FLOW(CFS) =   12.85
PIPE TRAVEL TIME(MIN. ) =   0.18    Tc(MIN.)=   7.97
LONGEST FLOWPATH FROM NODE  10000.00 TO NODE   3038.00     635.53 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES)             3.40  TC(MIN.) =      7.97
PEAK FLOW RATE(CFS)          12.85

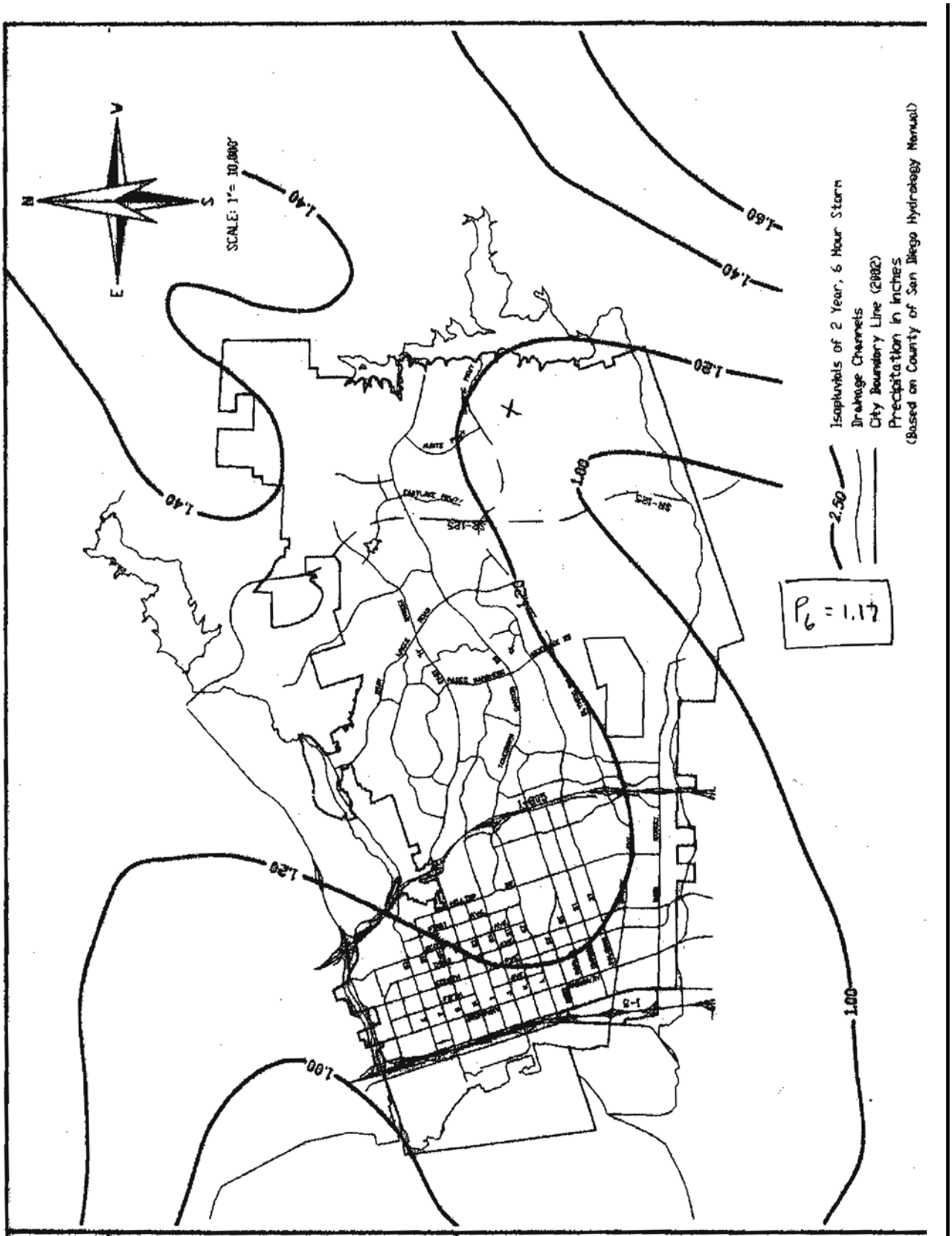

END OF RATIONAL METHOD ANALYSIS
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APPENDIX D

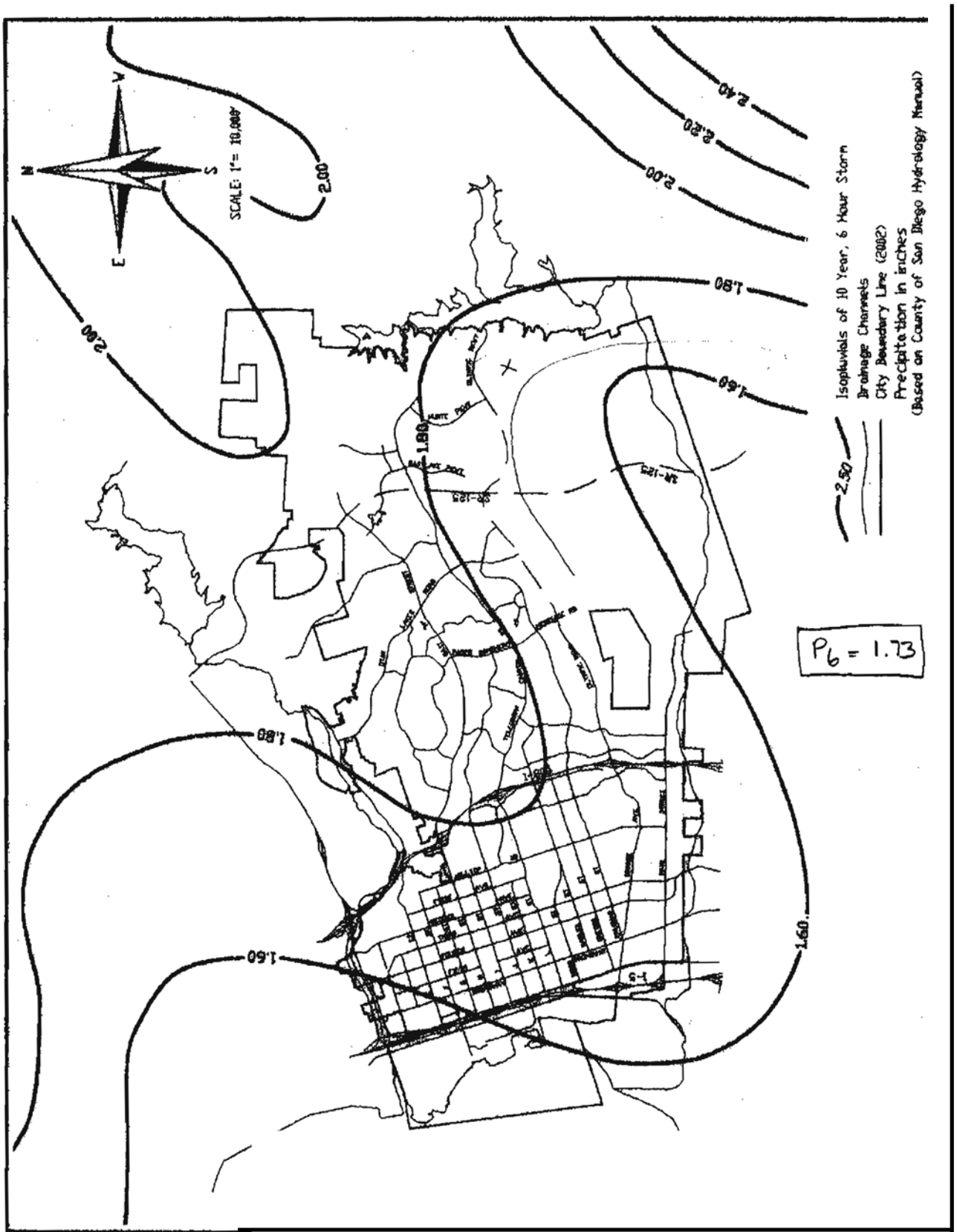
Back Up Information for Rational Method Analyses

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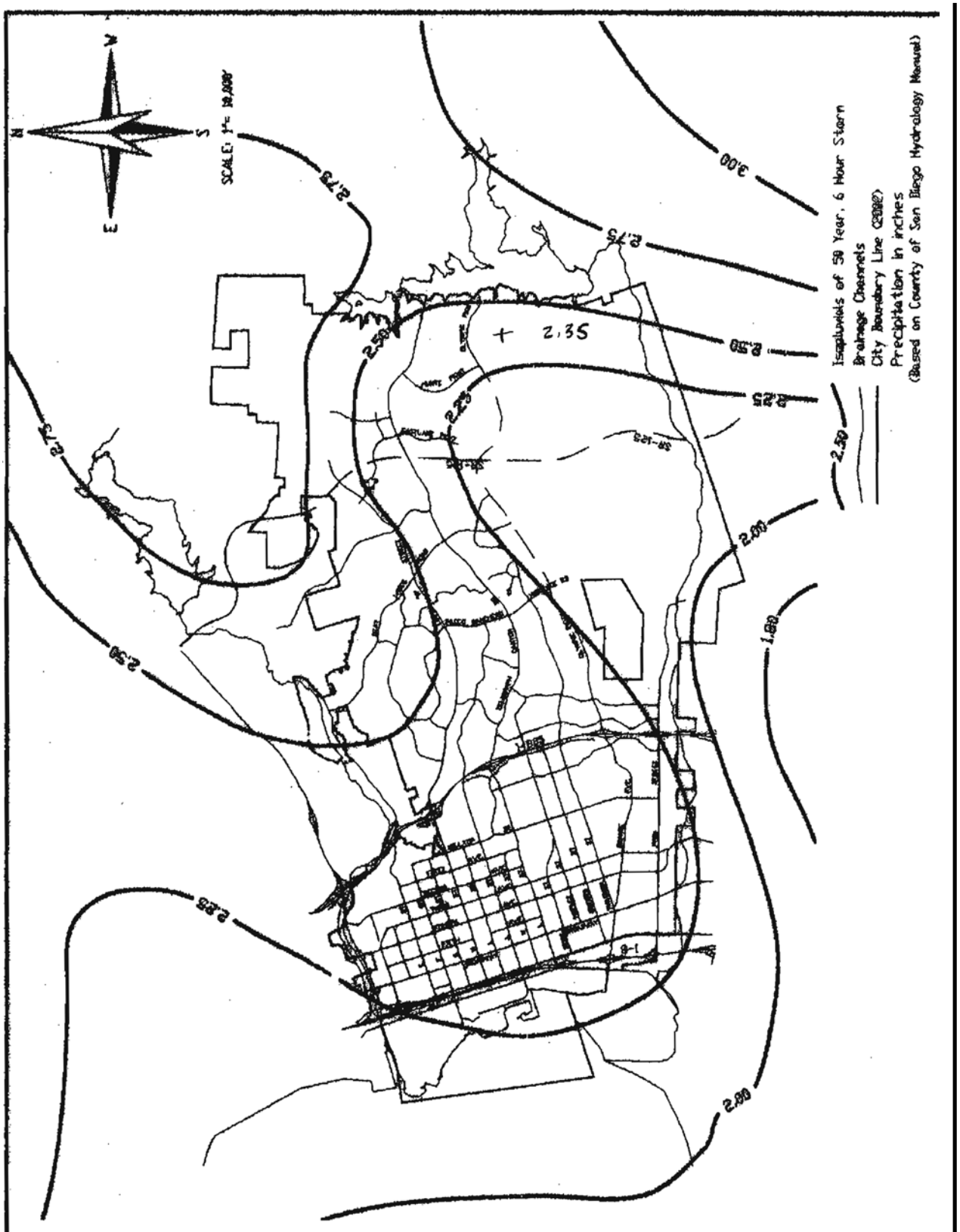
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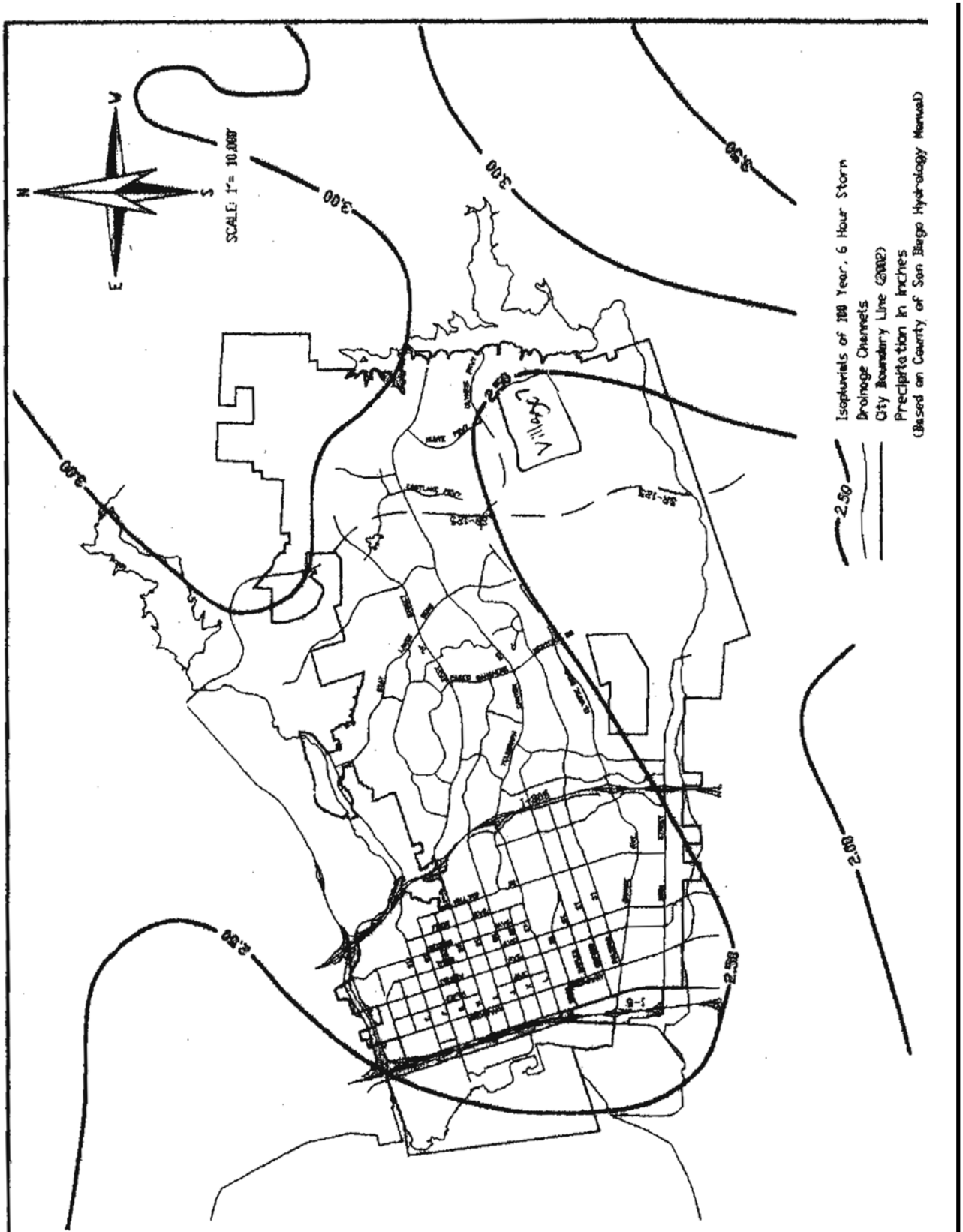
Revised:	Original approval date: 01-29-02	CITY OF CHULA VISTA
M.P.M 1-29-02	Drawn By: C.V.M. Date: 01-29-02	PUBLIC WORKS DEPARTMENT
	CITY ENGINEER Date: 11-7-02	2 YEAR, 6 HOUR PRECIPITATION — CVD-DR02



Revised:	Original appr 0¥01 date: 01_211_2	CITY OF CHULA VISTA	
M.P.M 2-02	Drawn By: C.V.M.	Dst.:01-29-o	PUBLIC WORKS DEPARTMENT
	Clifford Swanson	10 YEAR, 6 HOUR PRECIPITATION	CVO-DRo3
	CITY ENGINEER Date:11-7-02		



Revised:	Original approval date: 01-29-02	CITY OF CHULA VISTA	
M.P.M 2-02	Redrawn By: M.P.M	Date: 01-29-02	PUBLIC WORKS DEPARTMENT
	Clifford Swan	50 YEAR, 6 HOUR PRECJPITATION	CVO-OR0-4-
	CITY ENGINEER Date: 11-7-02		



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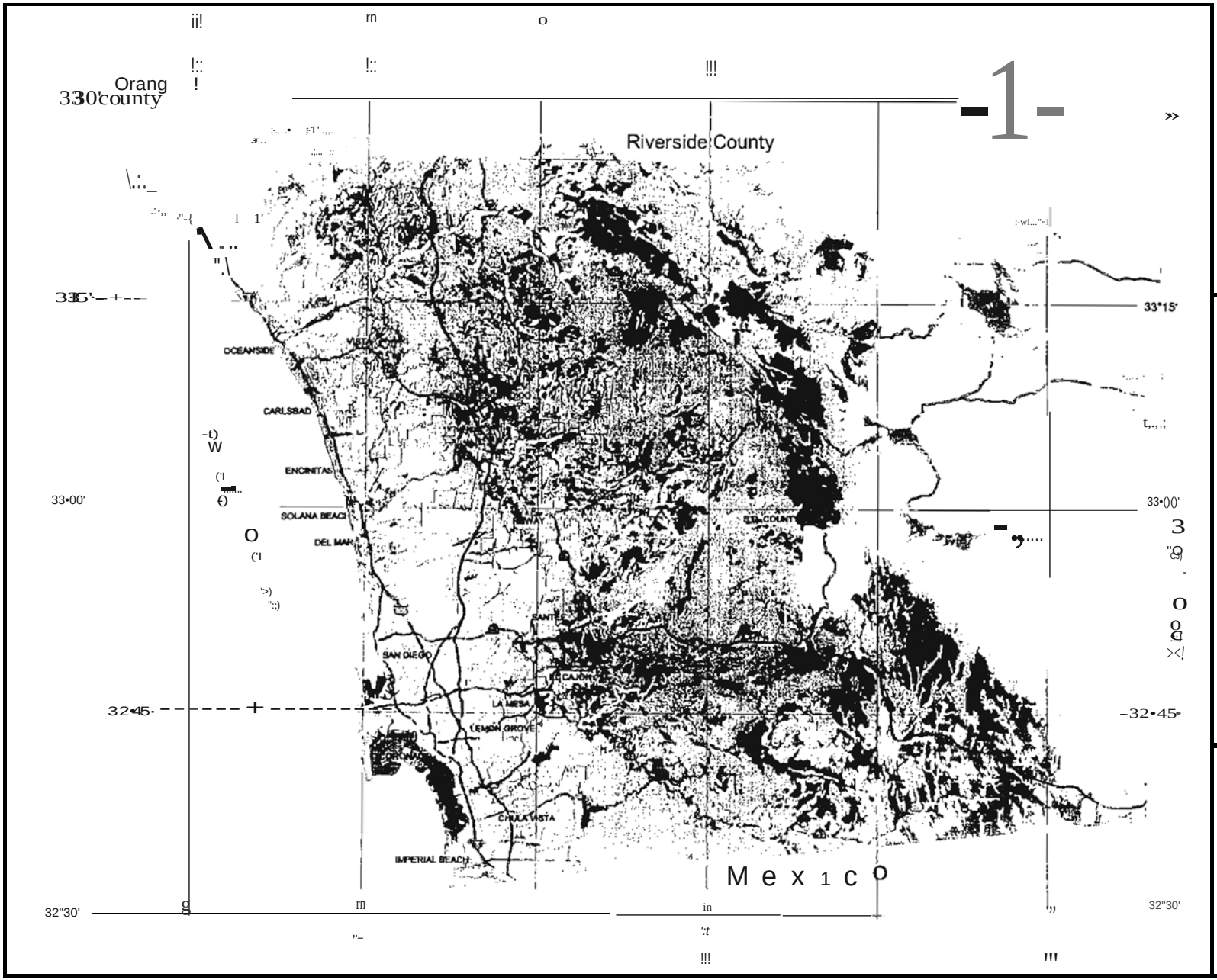
111. P.li't 2-02 RedrllWll : c.v.M. .te:01-21Ht2 PUBLIC WORKS DEPARTMENT

CITY ENGINEER Date: 11-7-02

100 YEAR, 6 HOUR PRECIPITATION CVO-DRo

County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Groupe B
- Group C
- Group D
- Undelennined
- Data Unavailable

– GIS

GENERAL DESIGN CRITERIA
SECTION 3-200
HYDROLOGY/DRAINAGE/URBAN RUNOFF

3-200 HYDROLOGY/DRAINAGE/URBAN RUNOFF

3-201 General

This section establishes design criteria and procedures to be followed in the design of stonn drain facilities.

3-201.1 Definitions

(1) Major Drainage Channel or System - A channel which drains an area in excess of 750 acres (3km2).

(2) Lateral Drainage Channel or System - A channel which drains an area in excess of 100 acres (0.40km2) but less than 750 (3km2) acres and empties into a major channel.

(3) Local Drainage Channel or System - A drainage system which collects local runoff from an area of less than 100 acres (0.40km2) and transports water to a lateral or major system.

(4) Drainage Channel or System - An open or closed conduit, improved or unimproved, designed for the purpose of collecting and transporting stonn water runoff in such manner as to protect public and private property.

(5) Drainage Structure - A catch basin, outlet, inlet, headwall, spillway, energy dissipater, junction box, cleanout box, diversion box, etc., in a drainage channel or closed conduit system.

(6) Design Storm - A storm of a magnitude that may be expected to occur once during a specified number of years and resulting in the maximum storm water runoff to be anticipated once during that specified number of years.

(7) Dry Lane - A minimum street width that shall not be inundated at all times during a given design storm.

3-201.2 General Responsibility for Drainage Facilities - The developer of a proposed subdivision is required to:

(1) Accept any drainage entering a proposed subdivision and to provide adequate drainage facilities to convey all drainage on the property to discharge into, or connect to, the drainage facility into which the drainage would naturally flow;

(2) Provide on-site storm detention facilities such that the post-development flow rate for a given design storm does not exceed the pre-development flow rate at the outlet of the subdivision;

(3) Provide on-site erosion protection and desilting facilities

(4) Provide bonds for the cost of design and construction of any drainage facilities, including but not limited to off-site easements or facilities, necessary to accomplish these responsibilities.

(5) Provide all graded pads with adequate drainage facilities as approved by the City Engineer.

(6) Submit plans for all private storm drain systems for review and approval by the City Engineer.

3-201.3 Design Flows. Storm drain facilities shall be designed to convey design flows as follows:

(1) All major drainage channels shall be designed to discharge a 100-year ultimate stonn, without static head;

(2) Lateral channels shall be designed to discharge a 5{}:.year storm without static head at entrances and a 100-year ultimate storm utilizing available head without causing any damage to surrounding property;

(3) Local channels and drainage facilities within street right of ways shall be designed to discharge a 50-year stonTl utilizing available head without causing any property damage

(4) All storm drainage systems shall be designed so that the combination of the underground storm drain capacity and street overflow without dry-lane limitations shall convey the 100-year stoml event without property damage.

(5) Where a sump condition exists and excess runoff has no alternate route, special design shall be required for the protection of property.

(6) At all major intersections (with major, prime or expressways), surface drainage shall be fully intercepted by property sized inlets. All inlets adjacent to major intersections shall be designed to intercept a 50-year storm event.

3-202 Hydrologic/Drainage/Urban Runoff Reports

Hydrology and/or drainage reports shall be submitted as required per this manual. Reports shall include the following:

3-202.1 A suitable and recent topographic map that shows the following:

(1) On-site drainage maps at a minimum scale of 1ft=100' (1cm=10m)

(2) Off-site drainage maps scales may vary depending on the size of the drainage area covered by the map.

(3) Shows appropriate contours on the map for the drainage on-site and extending beyond the subdivision boundary to indicate the drainage pattern.

(4) Indicate the existing basin boundaries and existing drainage facilities.

(5) Show proposed subdivision layout, proposed drainage systems, and proposed basin layout.

(6) Show quantity of flow and time of concentration at each inlet, outlet, interceptor, point of concentration or confluence points.

(7) All drainage area labels, points of concentration labels and system designations shall be shown in the logical order corresponding to the attached calculations.

(8) Indicate all crests, sags and street intersections with flow arrows.

(9) Compare pre-development and post-development flow rates for a given design storm at the outlet(s) of the subdivision.

(10) To mitigate runoff due to development, show on-site regional detention/desilting facilities that act as treatment control structural Best Management Practices (BMPs). Temporary and permanent detention/desi lting facilities shall be shown on the plans.

3-202.2 Report Calculations

(1) Hydrology studies shall use appropriate methods and show in detail the detennination of basin areas, basin flows, time of concentration, and all assumptions and physical data

(2) Hydraulic studies shall show that all conduits, channels and appurtenances are adequate to handle design flows. Studies shall include entrance and exit conditions, head losses, design flows and velocities, critical depth, scouring and silting velocities, energy and hydraulic gradient lines.

(3) , Hydraulic studies shall also include a profile plot for all proposed channels showing channel flow line and water surface profile and hydraulic gradient line for the design-year stomi event.

(4) Detention basin calculations shall include inflow and outflow hydrographs developed using an acceptable modeling procedure.

(5) Erosion control calculations shall show that silt and debris generation will be contained on-site using proposed measures including desilting and sedimentation basins.

3-203 Hydrology

3-203.1 Previously Approved Reports - Runoff quantities; as set forth or derived from the report prepared by Lawrence, Fogg, Florer and Smith titled "A Special Study of Storm Drain Facilities" on fde in the office of the City Engineer may be used in the design of drainage facilities in Chula Vista. A

hydrologic study prepared and approved at General Development Plan (GDP) or Specific Planning Area (SPA) plan may be used as determined by the City Engineer.

3-203.2 For local drainage basins, storm discharge flow may be estimated based on the Rational Method or the Modified Rational Method. For all lateral and major drainage basins the SCS method, U.S. Army Corps of Engineers HEC-1 computer method or other tabular or computer method may be used upon City Engineer approval.

3-203.3 Rational and Modified Rational Methods

(1) The rational method equation relates stonn rainfall intensity (I), a selected runoff coefficient (C) and drainage area (A) to the peak runoff rate (Q):

$$Q = CIA \text{ (Empirical Units)}$$

where:

Q = Peak runoff in cubic feet per second
C = Runoff coefficient
I = Intensity, inches per hours
A = Drainage basin area in acres

Or

$$Q=0.278CIA \text{ (Metric Units)}$$

where:

Q = Peak runoff in cubic meters per second
C = Runoff coefficient
I = Intensity in millimeters per second
A = Drainage area in square kilometers

(2) Coefficient of Runoff: Consider probable development. Use highest number of the following values:

a)	Paved Surface	0.90
b)	Commercial Area	0.85
c)	Dense Residential (R2,R3)	0.75
d)	Normal Residential (R1)	0.65
e)	Suburban Property (RE)	0.55
f)	Barren Slopes Steep	0.80
g)	Barren Slopes Hilly	0.75
h)	" " Rolling	0.70
i)	Flat	0.65
j)	Vegetated Slopes Steep	0.60
k)	" Hilly	0.55
l)	" Rolling	0.50
m)	Flat	0.45
n)	Fann Land	0.35
o)	Parks, Golf Courses	0.30

NOTES:

Steep =	Steep, rugged terrain with average slopes generally above 30%.
Hilly =	Hilly terrain with average slopes of 10% to 30%.
Rolling =	Rolling terrain with average slopes of 5% to 10%.
Flat =	Relatively flat land, with average slopes of 0% to 5%.
Composite =	Where drainage areas are composed of parts having different runoff characteristics, a weighted coefficient for the total drainage area may be used.

The runoff coefficient for a basin should be a composite coefficient made of the many different runoff coefficients for the sub-areas of the basin per equation:

$$\underline{CAr = C1A1 + C.zAz + ...CnAn}$$
$$n$$

(3) Time of Concentration (Ie = minutes) is the time required for runoff to flow from the most remote part of the watershed to the outlet point under consideration. With exceptions for limited natural watersheds, the time of concentration shall be calculated as tonows:

a) $t_c = t_i + t_f$ where:

= Initial time or over1and flow time of concentration, the time required for runoff to flow to the first inlet or to the street gutter

4 = Travel time of concentration, the time required for runoff to flow within street gutters to inlets, with channels or within storm drain pipes.

b) may be calculated using the following natural watershed flow formula:

$$4 = 60x((11.9L^3)/H]^{o"385}$$

L = Length of water shed (miles)
H = Difference in elevation from furthermost point to the design point (feet).

If computed 4 is:	Add
Less than 5 Minutes	6 Minutes
5-10 Minutes	5 Minutes
11-15 Minutes	Use 15 Minutes
Greater than 15 Minutes	0 Minutes

NOTE: *Add minutes only when using this fonnufa.*

c) or, t_1 may be calculated using the following flow formula for developed areas with overland flow:

$$= \frac{1.8(1.1-C)YD}{3...Js} \quad \text{(in minutes)}$$

D = Length of watercourse (feet)
S = Slope (percent)
C = Runoff coefficient

d) For limitations in using these formulas, refer to the San Diego County Hydrology Manual.

(4) Intensity of Rainfall (I = inches/hr.) – The rainfall intensity (1) can be calculated using the following equation:

I = 7.44 Ps 0--0- [5]

P6 = adjusted 6-hour storm precipitation (If P6 is not within 45% to 65% of P24, increase or decrease P6 as necessary to meet this criteria.)

D = duration in minutes (use tc)

No_te: (1) This equation applies only to the 6-hour storm.
(2) The 24-hour isopluvi.µs are available from the County. The 6-bour isopluvials are in Chula Vista Design Standards.

(5) Area of water shed (A = acres), measured using suitable topographic map.

3-203.4 other recognized hydrologic methods to detemiine runoff may be used, if substantiated, and approved by the City Engineer.

3-203.5 Whenever 6-hour stOllll precipitation rates (10, 50 or 100-year) are used to determine rainfall intensity, the lsopluvial Maps of the City of Chula Vista shall be used.

3-204 Drainage Criteria

The storm drainage system, consisting of surface and sub-surface facilities, shall be designed of sufficient capacity, without regards to dry-lane requirements, to convey the 100-year storm event without any damage to properties.

3-204.1 Street System

(1) For local drainage systems, inlet size and spacing shall be designed to intercept a 50-year storm without exceeding the City dry lane requirements and without causing property damage.

(2) Underground storm drain facilities, pipes and appurtenances shall be designed to discharge a 50-year storm runoff in an open channel flow condition. If offsite conditions create a seal, special pipe and/or ;oint design may be required for pressure flow.

(3) Dry-lane Requirements In no case shall flow (Qso) exceed the top of the curb.

a) Expressways, Six-lane Prime Arterials, and Six-lane Major roads shall maintain two driving lanes dry in each direction.

b) Four-lane Major, Class I Collector and Village Entry roads shall maintain a 12-foot dry lane on each side of centerline (or raised median)

c) Class II and Class III Collector, Secondary Village Entry, Promenade and Residential Streets' flow shall not exceed the top of curb

d) Industrial streets' flow shall not exceed the top of curb.

(4) All drainage shall be intercepted and collected at superelevated roadway transition· sections where concentrated flows are not permitted to cross travel lanes under the design stonn frequency for the street Median inlets shall be designed and spaced so the lane adjacent to the median (number one lane or fast lane of traffic adjacent to the median) is free from drainage flow for the design storm frequency.

(5) Under no circumstances shall the flow on one side of given street at a set slope exceed the capacity of a 21 foot inlet (20' opening) to intercept 100% of the flow (Qso).

3-204.2 Storm Drain Facilities - Specific methods of handling storm drainage are subject to detailed approval of the City Engineer based on currently accepted engineering practices supported by thorough engineering calculations. The following guidelines shall be used for worl< in the City of Chula Vista.

(1) The following Manning "n" factors are to be used:

a)

CMP, fully bituminous coated	0.024	(Not allowed in City maintained system)
CMP, fully asphalt paved	0.018	(Not anowed in City maintained system)
CMP, invert asphalt paved	0.023	(Not allowed in City maintained system)
RCP, All	0.013	
Cast in place	0.014	
PVC, ALL	0.012	

b)

Channel	
P.C.C., formed, no finish	0.015
P.C.C., trowel finish	0.013
P.C.C., float finish	0.014
Gunite, no finish	0.019

Gunite, trowel finish 0.015

c) "n" factors for other materials or type of construction shall be as approved by the City Engineer.

(2) Public storm drain pipes shall be reinforced concrete pipe (RCP) unless otherwise stated below or approved by the City Engineer. Corrugated metal pipe (CMP) shall not be used unless specifically approved by the City Engineer.

(3) Minimum pipe diameter shall be 18" (46cm), minimum "D• load rating for RCP within the right of way shall be 1500.

(4) Storm drainage must be enclosed within a closed conduit for design runoff within a street right OI' way or City easement that can be carried in a 42" (107cm) diameter' pipe or less.

(5) Minimum grade of stonn drains and culverts shall be 0.5%.

(6) Maximum grade for RCP stonn drains shalt be 40%. PVC pipe may be used for grades greater than 40%.

(7) Maximum cleanout spacing:

a) Pipe diameters equalto or less than 30• (76cm): 300 feet (91m).

b) Pipe diameters greater than 30" (76cm): 800 feet (244m).

c) Storm drains constructed on grades greater than 20% shall use concrete anchors per Regional Standard S-9 at intervals of not more than 40 feet (12m).

(8) Storm Drain Systems – Shall be designed to convey runoff flow from inlets to cleanouts to the system outlet. Inlets will not be allowed on any system pipe larger than 18", unless approved by the City Engineer.

(9) Pipe Radius/Watertight Pipe

a) The radius of pipes in curves shall be based on standard or single bevel or double bevel pipe without breaking joints and shall comply with City of San Diego Drainage Design Manual, Table 1-103.7A. Pipe bevel and length shall be shown on plans.

b) The deflection angle at the inlet or cleanout shall be indicated on the plans and shall not be more than 10 degrees, unless special design is provided by the Engineer of Work on the plans.

c) For all storm drains under pressure, where the design HGL is 1-foot above the inside top of pipe elevation, watertight joints shall be used. Watertight joints shall also be used for storm drains constructed on grades of 20% or greater. If watertight, beveled pipe is proposed the Engineer of Work shall submit evidence that

the proposed pipe is readily available. Further, the use of pipe collars will not be allowed inplace of manufactured watertight joints.

d) Prior to construction, the contractor shall submit lay out sheets to the City for the following cases:

i) where horizontal and vertical curves are combined;
ii) where beveled pipe lengths other than 4-feet or 8-feet is required to fit the curve.

(10) Easements:

a) Minimum width of stonn drain easements shall be equal to the pipe diameter plus ten feet (3m) or a minimum of 15 feet (5m) in width, whichever isgreater.

b) Minimum width of easements for improved channels shall be equal to the width of the improved channel plus ten feet (3m), or a minimum of fifteen feet (Sm), whichever is greater.

c) Easements for natural channels shall include the inundation line for the design flood.

d) No fences, walls, or other construction shall be auth6rized within a drainage easement without the specific written approval of the City Engineer. Easement shall not split lot lines without specific written approval of the City Engineer:

e) No structures, poles, wires or other appurtenances shall extend, or pass over, the boundaries of any drainage easement without the specific written approval of the City Engineer.

f) Drainage easements for open channels shall not be included in building lot area calculations but may be included in setback requirements.

(11) Safety fences or walls shall be constructed alongside improved channels or as directed by the City Engineer.

(12) Minimum freeboard for channels and brow ditches shall be 6 inches (1Scm). For supercritical velocities very close to the critical velocity, make the wall heights at least equal to the sequent depth. For curved alignments, add 1.0 foot (0.3m) above the calculated maximum superelevated water surface.

(13) For supercritical velocities very close to the critical velocity, make the wall heights at least equal to the sequent depth. For curved alignments, add 1.0 foot (0.3m) above the calculated maximum.

(14) Inlets and inlet transition shall not be placed within pedestrian crosswalks or driveways.

(15) Provide a minimum of 10 foot (3.0m) curb transition on both sides of inlets unless otherwise approved by the City Engineer.

(16) Grates will not be considered in calculations as capable of receiving any flow of water since they are easily clogged with debris.

(17) Grates shall be capable of being safely crossed by bicycles.

(18) Permanent improved access shall be provided for maintenance of all public drainage facilities.

(19) Where public storm drains outlet across private property or open space drainage facilities shall be designed to meet structural and hydraulic requirements of the City Engineer. Minimum freeboard of 6" to be maintained.

3-204.3 Runoff Detention Basins

(1) The rate of inflow to the storage facility (inflow hydrographs) shall be developed using an acceptable hydrologic procedure, and shall be based on the watershed conditions expected to prevail during the anticipated effective life of the structure. Permanent facilities shall assume ultimate development of the contributing areas.

(2) Detention facilities shall be designed to convey a minimum 100-year frequency storm with a minimum 1-foot (0.3m) freeboard and utilizing maximum expected siltation elevation.

(3) The maximum allowable release rate after development shall not exceed pre-development flow rates. The 10, 50, and 100 year storm events shall be analyzed when releasing flows into a natural channel or when requested by the City Engineer.

(4) Adequate energy dissipation features shall be incorporated to reduce outflow velocities to acceptable levels to avoid downstream erosion.

(5) An emergency or overflow spillway shall be provided to pass the design flow if the principal outlets become blocked.

(6) Outlet facilities shall pass all runoff from a 100-year frequency storm event within a reasonable length of time as determined by the City Engineer.

(7) The California Division of Safety of Dams has jurisdiction over detention facilities: a) meeting or exceeding 25 feet (7m) in height and storing 15 acre-feet (18,500 m^3) or more; or b) of any height storing 50 acre-feet (61,700 m^3) or more; or as determined by the State of California.

(8) Embankment slopes shall be planted to provide erosion protection as determined by the City Engineer.

(9) Developer shall be required to maintain detention facilities in accordance with conditions or tentative map approval. A maintenance schedule shall be submitted for approval by the City Engineer prior to City acceptance of permanent facilities.

(10) Drainage structures within basins shall be provided with a reinforced concrete pad for maintenance purposes. The size, shape and location of the pad will be determined/approved by the City Engineer and Deputy Director of Operations.

3-204.4 Sediment Basins - Sedimentation basins shall be designed to provide adequate storage of sufficient duration to cause deposition of transported sediment as determined by the City Engineer.

. (1) Vegetation shall be planted on all slopes within the subdivision and on the embankments of the basin to avoid erosion.

(2) Elevation marks shall be placed on the outlet riser pipe to monitor sediment levels.

(3) Sedimentation basins shall be maintained per a maintenance plan approved by, or as determined by the City Engineer.

(4) Pipe outlets shall consist of a perforated vertical pipe or box-type riser connected to a horizontal pipe that extends beyond the downstream embankment or that connects to an existing storm drain system.

(5) An emergency spillway shall be provided so that the capacity of the spillway alone will convey the 1OD-year design flood.

(6) Basins shall be designed to retain the design flood with a minimum 2-foot (0.6m) freeboard.

(7) Desllting basln(s) shall be designed using the standard equation:

$$As = l.2Q/Vs$$

Where: *As* is the minimum surface area for trapping soil particles of a certain size; *Vs* is the settling velocity of the design particle size chosen; and Q = C x I x A where Q is the discharge rate measured in cubic feet per second; C is the runoff coefficient; I is the average precipitation intensity for the 10-year, 6-hour rain event and A is the disturbed and undisturbed areas draining into the sediment basin in acres. The design particle size shall be the smallest soil grain size determined by wet sieve analysis, or the fine silt sized (0.01mm) particle, whichever is the largest, and the Vs used shall be 100 percent of the calculated settling velocity.

The length is detennined by measuring the distance between the inlet and the outlet; the length shall be more than twice the dimension as the width; the depth shall not be less than three feet nor greater than five feet for safety

reasons and for maximum efficiency (two feet minimum of settling depth plus the depth needed for sediment storage). The sediment storage volume shall be detennined using the "Basic Soil Loss" table (see below) or any other methodology approved by the City Engineer. The basin(s) shall be located on the site where it can be maintained on a year-round basis and shall be maintained on a schedule to retain the two feet minimum of settling depth.

A sediment basin shall have a means for dewatering within 3 to 7 calendar days following a storm event. Sediment basins may be fenced if safety (worker or public) is a concern, or as determined by the City Engineer.

BASIC SOIL LOSS TABLE
(in cubic yards)*

TRACT AREA (acres)	AVERAGE SLOPES					
	2%	5%	8%	10%	12%	15%
10	270	350	370	400	450	500
15	400	420	460	600	675	750
20	540	700	740	800	900	1000
40	1080	1400	1480	1600	1800	2000
80	2160	2800	2960	3200	3600	4000
100	2700	3500	3700	4000	4500	5000
150	4000	4200	4600	6000	6750	7500
200	5400	7000	7400	8000	9000	10000

* *Engineer shall interpolate the figures listed in the tables as required.*

3-204.5 Items to be Submitted with Drainage Calculations - To ensure proper design and to simplify and expedite checking procedures, design calculations and related information are required for all drainage facilities including the following:

(1) Engineer's design calculations

(2) A suitable topographic map, which includes the subdivision and the total drainage basin with the sub-basins delineated and labeled.

(3) Calculations showing the determination of design flow, including all assumptions and physical data.

(4) Calculations showing that all conduits, channels, and appurtenances are adequate for design flows; to include entrance and exit conditions, head losses,

hydraulic jumps, critical depths, scouring and silting velocities, energy line elevation at the entrance, exit, and at each junction, bend, and angle point, and any other items affecting the functioning of the facility.

(5) A profile (to scale) showing the bottom of the channel or pipe, the hydraulic grade line, and the design flow and velocity.

(6) Calculations showing that the requirements for dry lanes will be met.

(7) All assumptions and input file information for computer programs along with a list of abbreviations and symbols used.]

3-205 Storm Water Quality and Urban Runoff

Prior to approval of any and aU grading, construction, and building permits for the project, the Developer shall demonstrate to the satisfaction of the City Engineer compliance with all of the applicable provisions of the following and any amendments thereto.

(1) The City of Chula Storm Water Management and Discharge Control Ordinance (Chula Vista Municipal Code Section 14.20).

(2) NPDES Municipal Permit No. CAS0108758 (San Diego Regional Water Quality Control Board Order No. 2001-001).

(3) NPDES Construction Permit Co. CAS000002 (State Water Resources Control Board Order No. 99-08-DWQ), including modifications dated April 26, 2001, where applicable.

During project planning and design, the Developer shall incorporate effective construction and post-construction Best Management Practices and provide all necessary studies and reports as detennined by the City Engineer demonstrating compliance with the applicable regulations and standards.

APPENDIX E

50-Year Pipeflow Results

SYSTEM 1000

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
(Reference; LACFCD,LACRD, AND OCEMA HYDRAULICS CRITERION)
(c) Copyright 1982-2003 Advanced Engineering Software (aes)
Ver. 8.0 Release Date: 01/01/2003 License ID 1261

Analysis prepared by:

RICK ENGINEERING COMPANY
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San Diego, California 92110
619-291-0707 Fax 619-291-4165

DESCRIPTION Of STUDY

McMILLIN OTAY RANCH - VILLAGE 7 **J-14531-A**
PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000
50-YR STORM EVENT, ULTIMATE CONDITION **BY :PT**

FILE NAME: A:/1000.PIP
TIME/DATE OF STUDY; 14:45 09/28/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.}

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAO(FT}	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT}	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUN DS}
1074.00-		3.00	1878.39	2.18*	1895.21
)	FRICTION				
1061.00-		2.61 De	1812.32	2.13*	1917.41
)	JUNCTION				
1061.00-		2.39*Dc	1742.37	2.39*Dc	1742.37
]	FRICTION				
1060.00-		4.01*	2218.08	1.74	2024.26
)	MANHOLE				
1060.00-		3.80*	2151.28	1.77	1994.39
)	FRICTION	} HYDRAULIC JUMP			
1059.00-		2.39 De	1742.37	1.72*	2044.04
)	MANHOLE				
1059.00-		2.39 De	1742.37	1.75*	2015.86
}	FRICTION				
1050.00-		2.39 De	1742.37	1.77*	1996.82
}	JUNCTION				
1050.00-		2.48	1665.94	1.68*	1968.02
}	FRICTION				
1025.00-		2.37*Dc	1657.01	2.37*Dc	1657.01
}	JUNCTION				
1025.00-		5.49*	1560.51	0.99	754.58
)	FRICTION	} HYDRAULIC JUMP			
1024.00-		1.73 De	527.61	1.27*	597.31
}	MANHOLE				
1024.00-		1.73 De	527.61	1.43*	553.91
)	FRICTION				
1023.00-		1.73 De	527.61	1.31*	586.36

```
        ) MANHOLE
  1023.00-              1.73 De          527.61        1.52*             539.72
        } FRICTION
  1022.00-              1.73 De          527.61        1.28*             595.85
        f MANHOLE
  1022.00-              1.73 De          527.61        1.44 *            552.07
        ) FRICTION
  1014.00-              1.73 De          527.61        1.54*             538.26
        } JUNCTION
  1014.00-              1.64 De          436.89        1.53*             440.08
        } FRICTION
  1005.00-              1.64*De          436.89        l.64*De           436.89
        } JUNCTION
  1005.00-              3.25*            420.82        0.70              330.39
        } FRICTION        } HYDRAULIC JUMP
  1009.00-              L29*De           218.86        l.29*De           218.86
        } CATCH BASIN
  1009.00-              2.23*            163.43        1.29 De            60.64

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25
------------------------------------     ------------------------------------
  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
********************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1074.00            FLOWLINE ELEVATION =   509.65
  PIPE FLOW =      66.62 CFS        PIPE DIAMETER =  36.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   512.650 FEET

  NODE   1074.00 : HGL = <  511.832>;EGL= <  514.104>;FLOWLINE= <  509.650>

 ********************************************************************************
  FLOW PROCESS FROM NODE  1074.00 TO NODE  1061.00 IS CODE =  1
  UPSTREAM NODE  1061.00     ELEVATION =   510.49   (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCDJ :
  PIPE FLOW          66.62 CFS     PIPE DIAMETER =  36.00 INCHES
  PIPE LENGTH =      68.34 FEET          MANNING'S N      0.01300

  NORMAL DEPTH(FT) =      2.23           CRITICAL DEPTH(FT) =      2.61
============================== ====================== ========================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT} =     2.13
======== ============== ================ ======================;============
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT}            (FT)    {FT/SEC}     ENERGY(FT}     MOMENTUM( POUNDS}
         0.000           2.132     12.395          4.519          1917.41
         3.925           2.136     12.372          4.514          1915.62
         7.986           2.140     12.348          4.509          1913.84
        12.197           2.143     12.325          4.504          1912.09
        16.571           2.147     12.301          4.498          1910.35
        21.123           2.151     12.278          4.493          1908.62
        25.872           2.155     12.255          4.488          1906.92
        30.840           2.159     12.232          4.483          1905.23
        36.051           2.162     12.209          4.478          1903.56
```

```
        41.536          2.166     12.186          4.474          1901.91
        47.328          2.170     12.163          4.469          1900.28
        53.471          2.174     12.141          4.464          1898.66
        60.017          2.178     12.118          4.459          1897.06
        67.030          2.181     12.096          4.455          1895.48
        68.340          2.182     12.092          4.454          1895.21

  NODE  1061.00 : HGL = <  512.622>;EGL;<    515.009>;FLOWLINE=  <  510.490>

**************************************************************************
  FLOW PROCESS FROM NODE  1061.00 TO NODE  1061.00 IS CODE =  5
  UPSTREAM NODE  1061.00     ELEVATION =   510.99  (FLOW IS AT CRITICAL DEPTH)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW    DIAMETER   ANGLE     FLOWLINE   CRITICAL   VELOCITY
                   (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
     UPSTREAM      58.94    30.00      0.00     510.99      2.39       12.206
    DOWNSTREAM     66.62    36.00               510.49      2.61       10.205
    LATERAL #1      4.56    18.00     90.00     511.99      0.82        2.902
    LATERAL #2      3.12    18.00     90.00     511.99      0.67        1.986
       Q5           0.00===Q5.EQUALS BASIN INPUT===

  LACFCO AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY= (Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3) -
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.01792
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00910
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01351
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.054 FEET         ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES   ( 0.973)+( 0.000) =   0.973

  NODE  1061.00 : HGL = <  513.376>;EGL= <  515.690>;FLOWLINE= <  510.990>

**************************************************************************
  FLOW PROCESS FROM NOOE  1061.00 TO NODE  1060.00 IS CODE =  1
  UPSTREAM NODE  1060.00     ELEVATION =   512.43  (FLOW UNSEALS IN REACH)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          58.94 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =     145.32 FEET          MANNING'S N     0.01300
  ===> NORMAL PIPEFLOW IS PRESSURE FLOW

  NORMAL DEPTH(FT) =      2.50           CRITICAL DEPTH(FT) =      2.39
==========================================================================
  DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     2.39
==========================================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)           (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM( POUNDS)
         0.000          2.386     12.203          4.700          1742.37
         0.006          2.390     12.191          4.700          1742.38
         0.025          2.395     12.179          4.700          1742.43
         0.057          2.400     12.168          4.700          1742.51
         0.101          2.404     12.157          4.700          1742.61
```

```
        0.159          2.409     12.146          4.701          1742.76
        0.229          2.413     12.135          4.701          1742.93
        0.313          2.418     12.125          4.702          1743.14
        0.409          2.422     12.115          4.703          1743.38
        0.520          2.427     12.105          4.704          1743.65
        0.643          2.432     12.096          4.705          1743.97
        0.781          2.436     12.087          4.706          1744.32
        0.932          2.441     12.078          4.707          1744.70
        1.097          2.445     12.069          4.709          1745.13
        1.276          2.450     12.061          4.710          1745.60
        1.470          2.454     12.054          4.712          1746.11
        1.679          2.459     12.046          4.714          1746.66
        1.903          2.463     12.039          4.716          1747.26
        2.142          2.468     12.033          4.718          1747.91
        2.398          2.473     12.027          4.720          1748.61
        2.670          2.477     12.021          4.722          1749.37
        2.960          2.482     12.016          4.725          1750.19
        3.268          2.486     12.012          4.728          1751.08
        3.598          2.491     12.008          4.731          1752.05
        3.951          2.495     12.005          4.735          1753.11
        4.339          2.500     12.003          4.739          1754.32
  ===> FLOW IS UNDER PRESSURE
      145.320          4.014     12.007          6.253          2218.08
------------------------ ------------------------- -------------------------
  NODE  1060.00 : HGL = <  516.444>;EGL= <  518.683>;FLOWLINE= <  512.430>

****************************************************************.************
  FLOW PROCESS FROM NODE  1060.00 TO NODE  1060.00 IS CODE =  2
  UPSTREAM NODE  1060.00     ELEVATION =   512.76  (FLOW IS UNDER PRESSURE)

  CALCULATE MANHOLE LOSSES(LACFCD):
  PIPE FLOW =      58.94 CFS            PIPE DIAMETER    30.00 INCHES
  FLOW VELOCITY =  12.01 FEET/SEC.     VELOCITY HEAD    2.239 FEET
  HMN = .05*(VELOCITY HEAD) = .05*( 2.239) =  0.112

  NODE  1060.00 : HGL = <  516.556>;EGL= <  518.795>;FLOWLINE= <  512.760>

**********************************   ***************************************
  FLOW PROCESS FROM NODE  1060.00 TO NODE  1059.00 IS CODE =  1
  UPSTREAM NODE  1059.00     ELEVATION =   518.43  (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          58.94 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =     200.00 FEET          MANNING'S N     0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT) =      1.78           CRITICAL DEPTH(FT) =      2.39
========================================================    ==================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.72
====================== ============ ================== ====================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE rnoM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL (FT)          (FT)    (FT/SEC)     ENERGY {FT)   MOMENTUM (POUNDS)
         0.000          1.716     16.409          5.899          2044 .04
         4.027          1.718     16.383          5.888          2041.65
```

8.212	1.720	16.358	5.878	2039.28
12.569	1.723	16.332	5.867	2036.92
17.114	1.725	16.307	5.857	2034.58
21.865	1.728	16.282	5.847	2032.25
26.844	1.730	16.257	5.836	2029.92
32.075	1.733	16.232	5.826	2027.62
37.588	1.735	16.207	5.816	2025.32
43.416	1.737	16.182	5.806	2023.03
49.599	1.740	16.157	5.796	2020.76
56.188	1.742	16.133	5.786	2018.50
63.243	1.745	16.108	5.776	2016.25
70.837	1.747	16.084	5.766	2014.01
79.065	1.749	16.059	5.757	2011.79
88.048	1.752	16.035	5.747	2009.58
97.945	1.754	16.011	5.737	2007.37
108.973	1.757	15.987	5.728	2005.18
121.434	1.759	15.963	5.718	2003.00
135.770	1.762	15.939	5.709	2000.84
152.670	1.764	15.915	5.700	1998.68
173.285	1.766	15.892	5.690	1996.54
199.772	1.769	15.868	5.681	1994.41
200.000	1.769	15.868	5.681	1994.39

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE. HEAD (FT) = 3.80

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD (FT}	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	3.796	12.007	6.035	2151.28
168.274	2.500	12.007	4.739	1754.33

ASSUMED DOWNSTREAM PRESSURE HEAD (FT) = 2.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL{FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY (FT)	PRESSURE+ MOMENTUM {POUNDS)
168.274	2.500	12 .003	4.739	1754 .33
168 .764	2 .495	12.005	4.735	1753 .11
169 .169	2 .491	12 .008	4.731	1752.05
169.527	2 .486	12 .012	4.728	1751.08
169.848	2 .482	12.016	4 .725	1750.19
170.139	2.477	12 .021	4 .722	1749 .37
170 .405	2.473	12 .027	4.720	1748.61
170 .648	2 .468	12 .033	4 .718	1747.91
170.870	2 .463	12 .039	4.716	1747.26
171.074	2.459	12 .046	4 .714	1746.66
171.260	2 .454	12 .054	4 .712	1746.11
171.430	2 .450	12.061	4.710	1745.60
171.585	2 .445	12 .069	4.709	1745 .13
171.726	2.441	12 .078	4.707	1744.70
171.853	2 .436	12 .087	4 .706	1744.32
n1.967	2 .432	12 .096	4.705	1743.97
172.068	2 .427	12 .105	4.704	1743.65

172.158	2.422	12.115	4.703	1743.38
172.236	2.418	12.125	4.702	1743.14
172.303	2.413	12.135	4.701	1742.93
172.358	2.409	12.146	4.701	1742.76
172.404	2.404	12.157	4.700	1742.61
172.438	2.400	12.168	4.700	1742.51
172.463	2.395	12.179	4.700	1742.43
172.478	2.390	12.191	4.700	1742.38
172.482	2.386	12.203	4.700	1742.37
200.000	2.386	12.203	4.700	1742.37

----------END OF HYDRAULIC JUMP ANALYSIS----------

PRESSURE+MOMENTUM BALANCE OCCURS AT 63.80 FEET UPSTREAM OF NODE 1060.00
DOWNSTREAM DEPTH = 3.305 FEET, UPSTREAM CONJUGATE DEPTH = 1.762 FEET

NODE 1059.00 : **HGL** = < 520.146>;EGL= < 524.329>;FLOWLINE= < 518.430>

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

FLOW PROCESS FROM NODE 1059.00 TO NODE 1059.00 IS CODE = 2
UPSTREAM NODE 1059.00 ELEVATION = 518.76 (FLOW IS SUPERCRITICAL)

CALCULATE MANHOLE LOSSES(LACFCD):
PIPE FLOW = 58.94 CFS PIPE DIAMETER 30.00 INCHES
AVERAGED VELOCITY HEAD = 4.106 FEET
HMN = .05*(AVERAGED VELOCITY HEAD) = .05*(4.106) = 0.205

NODE 1059.00 : **HGL** = < 520.505>;EGL= < 524.534>;FLOWLINE= < 518.760>

****

FLOW PROCESS FROM NODE 1059.00 TO NODE 1050.00 IS CODE = 1
UPSTREAM NODE 1050.00 ELEVATION = 522.00 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 58.94 CFS PIPE DIAMETER = 30.00 INCHES
PIPE LENGTH = 107.72 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 1.74 CRITICAL DEPTH(FT) = 2.39

==========

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.77

==========

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.766	15.895	5.692	1996.82
3.559	1.765	15.906	5.696	1997.88
7.276	1.764	15.918	5.701	1998.95
11.165	1.763	15.930	5.705	2000.01
15.242	1.761	15.942	5.710	2001.08
19.525	1.760	15.954	5.715	2002.15
24.035	1.759	15.965	5.719	2003.23
28.797	1.758	15.977	5.724	2004.30
33.840	1.757	15.989	5.729	2005.38
39.197	1.755	16.001	5.733	2006.47
44.910	1.754	16.013	5.738	2007.55
51.028	1.753	16.025	5.743	2008.64
57.610	1.752	16.037	5.748	2009.73
64.731	1.751	16.049	5.752	2010.83

```
        72.485          1.749     16.061          5.757          2011.92
        80.992          1.748     16.073          5.762          2013.02
        90.413          1.747     16.085          5.767          2014.13
       100.961          1.746     16.097          5.772          2015.23
       107.720          1.745     16.104          5.774          2015.86

  NODE  1050.00 : HGL = <  523.766>;EGL= <  527.692>;FLOWLINE= <  522.000>

****************************************************************************
  FLOW PROCESS FROM NODE  1050.00 TO NODE  1050.00 IS CODE =  5
  UPSTREAM NODE  1050.00     ELEVATION =   522.33  (FLOW IS SUPERCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER   ANGLE     FLOWLINE   CRITICAL   VELOCITY
                   (CFS)    (INCHES) (DEGREES} ELEVATION  DEPTH(FT.)  {FT/SEC)
     UPSTREAM      57.11      30.00       0.00     522.33      2.37       16.334
    DOWNSTREAM     58.94      30.00                522.00      2.39       15.900
    LATERAL #1      0.29      18.00      90.00     523.33      0.20        0.487
    LATERAL #2      1.53      18.00      81.00     523.33      0.46        2.570
       Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*VJ*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.03111
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02877
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.02994
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.120 FEET         ENTRANCE  LOSSES    0.000 FEET
  JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE  LOSSES)
  JUNCTION LOSSES   ( 0.456)+( 0.000) =   0.456

  NODE  1050.00 : HGL = <  524.005>;EGL= <  528.148>;FLOWLINE= <  522.330>

****************************************  ************** **** *** ********* ***
  FLOW PROCESS FROM NODE  1050.00 TO NODE  1025.00 IS CODE =
  UPSTREAM NODE  1025.00     ELEVATION =   526.20  (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          57.11 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =     102.55 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      1.57           CRITICAL DEPTH{FT) =      2.37

  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     2.37
============================================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)           (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
          0.000          2.372     11.860          4.558          1657.01
          0.107          2.340     11.953          4.560          1657.68
          0.422          2.308     12.057          4.567          1659.64
          0.943          2.275     12.172          4.577          1662.84
          1.674          2.243     12.297          4.593          1667.25
          2.624          2.211     12.431          4.612          1672.86
          3.805          2.179     12.576          4.636          1679.67
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         5.236          2.146     12.730          4.664          1687.69
         6.939          2.114     12.895          4.698          1696.94
         8.942          2.082     13.070          4.736          1707.45
        11.282          2.050     13.255          4.780          1719.24
        14.002          2.017     13.451          4.829          1732.35
        17.157          1.985     13.659          4.884          1746.83
        20.816          1.953     13.877          4.945          1762.72
        25.067          1.921     14.109          5.013          1780.09
        30.024          1.888     14.352          5.089          1798.98
        35.838          1.856     14.609          5.172          1819.48
        42.715          1.824     14.880          5.264          1841.64
        50.944          1.792     15.165          5.365          1865.57
        60.948          1.759     15.465          5.476          1891.33
        73.387          1.727     15.782          5.597          1919.04
        89.366          1.695     16.116          5.730          1948.80
       102.550          1.675     16.329          5.818          1968.02
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 NODE  1025.00 : HGL = <  528.572>;EGL= <  530.758>;FLOWLINE= <  526.200>

 ****************************************************************************
 FLOW PROCESS FROM NODE  1025.00 TO NODE  1025.00 IS CODE =  5
 UPSTREAM NODE  1025.00     ELEVATION =   526.53  (FLOW UNSEALS IN REACH)

 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                  (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)  (FT/SEC)
    UPSTREAM      25.77      30.00      0.00     526.53       1.73         5.250
   DOWNSTREAM     57.11      30.00                526.20       2.37        11.864
   LATERAL #1     15.29      18.00     86.00     527.20       1.41         8.652
   LATERAL #2     16.05      24.00     90.00     526.70       1.44         5.109
      Q5           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00395
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.01678
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01037
 JUNCTION LENGTH     4.00 FEET
 FRICTION LOSSES    0.041 FEET         ENTRANCE LOSSES    0.000 FEET
 JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES   ( 1.689)+( 0.000) =   1.689

 NODE  1025.00 : HGL = <  532.019>;EGL= <  532.447>;FLOWLINE= <  526.530>

*****************   ************************************************************
 FLOW PROCESS FROM NODE  1025.00 TO NODE  1024.00 IS CODE =  1
 UPSTREAM NODE  1024.00     ELEVATION =   537.95  (HYDRAULIC JUMP OCCURS)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          25.77 CFS     PIPE DIAMETER =  30.00 INCHES
 PIPE LENGTH =     309.03 FEET          MANNING'S N     0.01300

 HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

 NORMAL DEPTH(FT) =      0.98           CRITICAL DEPTH(FT) =      1.73
==================================;;=======  =========  =  =  =================
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UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.27

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.0bO	1.273	10.260	2.908	597.31
1.224	1.261	10.380	2.935	601.48
2.540	1.249	10.502	2.963	605.81
3.956	1.238	10.628	2.993	610.31
5.480	1.226	10.756	3.024	614.98
7.126	1.215	10.887	3.056	619.82
8.906	1.203	11.022	3.091	624.85
10.834	1.192	11.160	3.127	630.06
12.929	1.180	11.301	3.164	635.47
15.211	1.168	11.446	3.204	641.07
17.707	1.157	11.595	3.246	646.88
20.444	1.145	11.747	3.289	652.90
23.462	1.134	11.903	3.335	659.14
26.805	1.122	12.064	3.384	665.60
30.532	1.111	12.228	3.434	672.29
34.717	1.099	12.397	3.487	679.23
39.457	1.088	12.571	3.543	686.41
44.887	1.076	12.749	3.601	693.84
51.193	1.064	12.932	3.663	701.54
58.646	1.053	13.121	3.728	709.52
67.672	1.041	13.314	3.796	717.77
78.978	1.030	13.513	3.867	726.32
93.895	1.018	13.718	3.942	735.18
115.412	1.007	13.928	4.021	744.35
153.116	0.995	14.145	4.104	753.85
309.030	0.994	14.161	4.110	754.58

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 5.49

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL {FT)	PRESSURE HEAD{FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	5.489	5.250	5.917	1560.51
90.548	2.500	5.250	2.928	645.05

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 2.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
90.548	2.500	5.248	2.928	645.05
91.418	2.469	5.260	2.899	636.24
92.230	2.438	5.283	2.872	627.96
93.008	2.408	5.312	2.846	620.05
93.757	2.377	5.346	2.821	612.48
94.479	2.346	5.385	2.797	605.22
95.178	2.315	5.429	2.773	598.26

```
        95.852          2.284       5.477          2.751          591.59
        96.504          2.254       5.530          2.729          585.21
        97.133          2.223       5.586          2.708          579.12
        97.738          2.192       5.647          2.687          573.34
        98.319          2.161       5.712          2.668          567.85
        98.875          2.130       5.781          2.650          562.67
        99.405          2.100       5.854          2.632          557.81
        99.908          2.069       5.931          2.615          553.26
       100.382          2.038       6.012          2.600          549.05
       100.825          2.007       6.099          2.585          545.18
       101.235          1.976       6.189          2.572          541.65
       101.611          1.946       6.285          2.559          538.49
       101.949          1.915       6.386          2.548          535.70
       102.246          1.884       6.491          2.539          533.30
       102.500          1.853       6.603          2.531          531.30
       102.705          1.822       6.720          2.524          529.71
       102.859          1.792       6.843          2.519          528.55
       102.955          1.761       6.972          2.516          527.85
       102.988          1.730       7.108          2.515          527.61
       309.030          1.730       7.108          2.515          527.61
-----------------------END OF HYDRAULIC JUMP ANALYSIS---------------------- -
! PRESSURE+MOMENTUM  BALANCE OCCURS AT    79.75 FEET UPSTREAM OF NODE  1025.00 !
       DOWNSTRE.flM DEPTH = 2.856 FEET, UPSTREAM CONJUGATE DEPTH = 0.995 FEET !

  NODE   1024.00 : HGL = <  539.223>;EGL= <  540.858>;FLOWLINE= <  537.950>

**************************  * ************************************    ****** * *
  FLOW PROCESS FROM NODE  1024.00 TO NODE  1024.00 IS CODE =  2
  UPSTREAM NODE  1024.00     ELEVATION =   538.28   (FLOW IS SUPERCRITICAL)

  CALCULATE MANHOLE LOSSES(LACFCD):
  PIPE FLOW =      25.77 CFS            PIPE DIAMETER    30.00 INCHES
  AVERAGED VELOCITY HEAD =  1.426 FEET
  HMN = .05*(AVERAGED VELOCITY HEAD) = .05*{ 1.426) =  0.071

  NODE   1024.00 : HGL = <  539.714>;EGL= <  540.930>;FLOWLINE= <  538.280>

 ****************************************************************************
  FLOW PROCESS FROM NODE  1024.00 TO NODE  1023.00 IS CODE =  1
  UPSTREAM NODE  1023.00     ELEVATION =   541.24   {FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          25.77 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =     297.48 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      1.44           CRITICAL DEPTH( FT) =      1.73
=======================================    = ========== ====================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.31
======= ================================================  ====================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)     ENERGY( FT)    MOMENTUM(POUNDS)
          0.000         1.305      9.937          2.840          586.36
          2.865         1.311     .9.886          2.829          584.68
          _S.812        1.316      9.836          2.819          583.04
          8.848         1.321      9.786          2.809          581.42
```

11.981	1.327	9.737	2.800	579.84
15.222	1.332	9.688	2.790	578.28
18.582	1.337	9.639	2.781	576.76
22.072	1.343	9.591	2.772	575.26
25.709	1.348	9.544	2.763	573.79
29.510	1.353	9.497	2.755	572.35
33.496	1.359	9.451	2.747	570.94
37.694	1.364	9.405	2.738	569.56
42.134	1.369	9.359	2.731	568.20
46.856	1.375	9.314	2.723	566.88
51.909	1.380	9.270	2.715	565.57
57.355	1.385	9.226	2.708	564.30
63.280	1.391	9.182	2.701	563.05
69.794	1.396	9.139	2.694	561.83
77.058	1.402	9.096	2.687	560.63
85.301	1.407	9.054	2.680	559.46
94.885	1.412	9.012	2.674	558.32
106.410	1.418	8.970	2.668	557.19
121.006	1.423	8.929	2.662	556.10
141.210	1.428	8.888	2.656	555.03
175.159	1.434	8.848	2.650	553.98
297.480	1.434	8.845	2.650	553.91

NODE 1023.00 : **HGL** = < 542.545>;EGL= < 544.080>;FLOWLINE= < 541.240>

**********.**********.**********.*****

FLOW PROCESS FROM NODE 1023.00 TO NODE 1023.00 IS CODE = 2
UPSTREAM NODE 1023.00 ELEVATION = 541.57 (FLOW IS SUPERCRITICAL)

CALCULATE MANHOLE LOSSES(LACFCD) :
PIPE FLOW = 25.77 CFS PIPE DIAMETER 30.00 INCHES
AVERAGED VELOCITY HEAD = 1.292 FEET
HMN = .05*(AVERAGED VELOCITY HEAD) = .05*(1.292) = 0.065

NODE 1023.00 : **HGL** = < 543.094>;EGL= < 544.144>;FLOWLINE= < 541.570>

****

FLOW PROCESS FROM NODE 1023.00 TO NODE 1022.00 IS CODE = 1
UPSTREAM NODE 1022.00 ELEVATION = 543.14 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 25.77 CFS PIPE DIAMETER = 30.00 INCHES
PIPE LENGTH = 192.17 FEET MANNING'S N 0.01300

NORMAL DEPTH{FT) = 1.53 CRITICAL DEPTH{FT) = 1.73

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UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.28

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GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH {FT}	VELOCITY {FT/SEC}	SPECIFIC ENERGY{FT}	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.277	10.218	2.899	595.85
3.523	1.287	10.115	2.877	592.32
7.108	1.297	10.014	2.855	588.91
10.761	1.308	9.915	2.835	585.62
14.489	1.318	9.818	2.816	582.45

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        18.299          1.328       9.723          2.797          579.39
        22.199          1.338       9.629          2.779          576.44
        26.201          1.349       9.538          2.762          573.60
        30.315          1.359       9.448          2.746          570.86
        34.555          1.369       9.360          2.731          568.23
        38.939          1.380       9.274          2.716          565.69
        43.486          1.390       9.189          2.702          563.26
        48.221          1.400       9.106          2.689          560.92
        53.173          1.411       9.025          2.676          558.68
        58.383          1.421       8.945          2.664          556.53
        63.898          1.431       8.867          2.653          554.47
        69.784          1.441       8.790          2.642          552.50
        76.128          1.452       8.714          2.632          550.61
        83.055          1.462       8.640          2.622          548.82
        90.745          1.472       8.567          2.613          547.10
        99.477          1.483       8.496          2.604          545.47
       109.721          1.493       8.425          2.596          543.92
       122.357          1.503       8.357          2.588          542.45
       139.360          1.513       8.289          2.581          541.06
       167.071          1.524       8.222          2.574          539.74
       192.170          1.524       8.221          2.574          539.72
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  NODE  1022.00 : HGL = <  544.417>;EGL= <  546.039>;FLOWLINE= <  543.140>

****************************************************************************
  FLOW PROCESS FROM NODE  1022.00 TO NODE  1022.00 IS CODE =  2
  UPSTREAM NODE  1022.00     ELEVATION =   543.47   (FLOW IS SUPERCRITICAL)

  CALCULATE MANHOLE LOSSES(LACFCD}:
  PIPE FLOW =      25.77 CFS .           PIPE  DIAMETER    30.00 INCHES
  AVERAGED VELOCITY HEAD =  1.409 FEET
  HMN = .05*(AVERAGED VELOCITY HEAD) = .05*{ 1.409) =  0.070

  NODE  io22.oo  : HGL = <  544.914>;EGL= <  546.109>;FLOWLINE= <  543.470>

**********************************  ************* ******************************
  FLOW PROCESS FROM NODE  1022.00 TO NODE  1014.00 IS CODE =  1
  UPSTREAM NODE  1014.00     ELEVATION =   544.60  {FLOW IS SUPERCRITICAL}

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          25.77 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =     113.00 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      1.44           CRITICAL DEPTH(FT) =      1.73
================ ============================== ============================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.54
=========================================    ====; ==================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC        PRESSURE+
   CONTROL(FT}          (FT}    (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          1.536      8.144         2.567           538.26
         1.289          1.532      8.169         2.569           538.73
         2.661          1.528      8.194         2.571           539.20
         4.123          1.524      8.220         2.574           539.69
         5.684          1.520      8.245         2.576           540.19
         7.352          1.516      8.271         2.579           540.70
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          9.140          1.512       8.297          2.582          541.22
         11.060          1.508       8.323          2.585          541.75
         13.128          1.504       8.349          2.587          542.30
         15.361          1.500       8.376          2.590          542.85
         17.780          1.496       8.402          2.593          543.42
         20.412          1.492       8.429          2.596          544.00
         23.288          1.488       8.456          2.599          544.59
         26.447          1.484       8.483          2.603          545.19
         29.939          1.480       8.511          2.606          545.81
         33.827          1.476       8.538          2.609          546.43
         38.195          1.472       8.566          2.612          547.07
         43.156          1.468       8.594          2.616          547.72
         48.869          1.464       8.622          2.620          548.39
         55.567          1.461       8.650          2.623          549.06
         63.612          1.457       8.679          2.627          549.75
         73.606          1.453       8.708          2.631          550.45
         86.685          1.449       8.737          2.635          551.17
        105.395          1.445       8.766          2.638          551.90
        113.000          1.444       8.773          2.639          552.07
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  NODE   1014.00 : HGL = <  546.136>;EGL= <  547.167>;FLOWLINE= <  544.600>

*****************************************    ******************   ****  ' ******
  FLOW PROCESS FROM NODE  1014.00 TO NODE  1014.00 IS CODE =  5
  UPSTREAM NODE  1014.00     ELEVATION =   545.10   (FLOW IS SUPERCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW    DIAMETER    ANGLE    FLOWLINE  CRITICAL    VELOCITY
                   (CFS)   (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)  {FT/SEC)
     UPSTREAM      20.93    24.00       0.00    545.10      1.64         8.138
    DOWNSTREAM     25.77    30.00               544.60      1.73         8.147
    LATERAL #1      0.76    18.00      90.00    545.60      0.32         0.817
    LATERAL #2      4.08    18.00      90.00    545.60      0.77         4.387
       Q5           0.00===QS EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY={Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00990
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00814
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00902
  JUNCTION LENGTH      4.00 FEET
  FRICTION LOSSES     0.036 FEET          ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 0.488)+{ 0.000) =    0.488

  NODE   1014.00 : HGL = <  546.626>;EGL= <  547.654>;FLOWLINE=  <  545.100>

*******************************************************************************
  FLOW PROCESS FROM NODE  1014.00 TO NODE  1005.00 IS CODE =  1
  UPSTREAM NODE  1005.00     ELEVATION =   546.98   (FLOW  IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE  FLOW           20.93 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE  LENGTH  =     188.78 rnET           MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      1.52           CRITICAL DEPTH(FT} =      1.64
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UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.64

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH {FT}	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.639	7.593	2.535	436.89
0.022	1.634	7.613	2.535	436.89
0.091	1.630	7.633	2.535	436.91
0.211	1.625	7.653	2.535	436.93
0.386	1.620	7.674	2.535	436.97
0.621	1.616	7.695	2.536	437.02
0.922	1.611	7.716	2.536	437.08
1.296	1.606	7.737"	2.536	437.14
1.751	1.602	7.758	2.537	437.22
2.296	1.597	7.780	2.537	437.32
2.943	1.592	7.802	2.538	437.42
3.706	1.588	7.824	2.539	437.53
4.600	1.583	7.846	2.539	437.65
5.648	1.578	7.869	2.540	437.79
6.876	1.573	7.892	2.541	437.94
8.316	1.569	7.915	2.542	438.09
10.015	1.564	7.938	2.543	438.26
12.031	1.559	7.961	2.544	438.44
14.450	1.555	7.985	2.545	438.64
17.397	1.550	8.009	2.547	438.84
21.062	1.545	8.033	2.548	439.06
25.769	1.541	8.057	2.549	439.28
32.122	1.536	8.082	2.551	439.52
41.478	1.531	8.107	2.552	439.77
58.194	1.527	8.132	2.554	440.04
188.780	1.526	8.136	2.554	440.08

NODE 1005.00 : **HGL** = < 548.619>;EGL= < 549.515>;FLOWLINE= < 546.980>

FLOW PROCESS FROM NODE 1005.00 TO NODE 1005.00 IS CODE = 5
UPSTREAM NODE 1005.00 ELEVATION = 547.48 (FLOW UNSEALS IN REACH)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH {FT.}	VELOCITY (FT/SEC)
UPSTREAM	11.50	18.00	90.00	547.48	1.29	6.508
DOWNSTREAM	20.93	24.00		546.98	1.64	7.595
LATERAL #1	3.80	18.00	0.00	547.48	0.75	2.150
LATERAL #2	5.63	18.00	90.00	547.48	0.92	3.186
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Ql*Vl*COS(DELTA1) -Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/({Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.01199
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00856
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01027
JUNCTION LENGTH 4.00 FEET
FRICTION LOSSES = 0.041 FEET ENTRANCE LOSSES = 0.000 FEET

JUNCTION LOSSES = (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES = (1.874)+(0.000) = 1.874

NODE 1005.00 : **HGL** = < 550.73l>;EGL= < 551.389>;FLOWLINE= < 547.480>

****

FLOW PROCESS FROM NODE 1005.00 TO NODE 1009.00 IS CODE = 1
UPSTREAM NODE 1009.00 ELEVATION = 550.37 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 11.50 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 28.89 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESU4TS

NORMAL DEPTH(FT) = 0.61 CRITICAL DEPTH(FT) = 1.29

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.29

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL[FT]	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.293	7.097	2.076	218.86
0.017	1.266	7.227	2.077	219.01
0.070	1.238	7.368	2.082	219.47
0.162	1.211	7.521	2.090	220.25
0.297	1.183	7.687	2.102	221.36
0.479	1.156	7.866	2.118	222.82
0.716	1.129	8.059	2.138	224.65
1.013	1.101	8.267	2.163	226.88
1.379	1.074	8.490	2.194	229.52
1.824	1.047	8.731	2.231	232.62
2.361	1.019	8.991	2.275	236.19
3.004	0.992	9.271	2.327	240.27
3.774	0.965	9.572	2.388	244.91
4.693	0.937	9.898	2.460	250.16
5.793	0.910	10.251	2.542	256.07
7.113	0.882	10.632	2.639	262.70
8.706	0.855	11.046	2.751	270.11
10.645	0.828	11.496	2.881	278.40
13.032	0.800	11.986	3.033	287.66
16.018	0.773	12.522	3.209	297.98
19.839	0.746	13.107	3.415	309.51
24.889	0.718	13.751	3.656	322.39
28.890	0.703	14.146	3.812	330.39

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 3.25

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	3.251	6.508	3.909	420.82
19.887	1.500	6.508	2.158	227.73

```
  ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =     1.50

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS )
        19.887          1.500       6.506         2.158          227.73
        19.971          1.492       6.510         2.150          226.92
        20.045          1.483       6.518         2.144          226.19
        20.114          1.475       6.529         2.138          225.52
        20.178          1.467       6.542         2.132          224.89
        20.238          1.459       6.556         2.126          224.31
        20.294          1.450       6.572         2.121          223.76
        20.346          1.442       6.590         2.117          223.24
        20.396          1.434       6.608         2.112          222.76
        20.442          1.425       6.628        -2.108          222.31
        20.486          1.417       6.650         2.104          221.89
        20.527          1.409       6.672         2.101          221.50
        20.564          1.401       6.696         2.097          221.13
        20.599          1.392       6.720         2.094          220.79
        20.632          1.384       6.746         2.091          220.49
        20.661          1.376       6.773         2.088          220.20
        20.688          1.367       6.801         2.086          219.95
        20.712          1.359       6.830         2.084          219.72
        20.734          1.351       6.859         2.082          219.52
        20.753          1.343       6.890         2.080          219.35
        20.769          1.334       6.922         2.079          219.20
        20.782          1.326       6.955         2.078          219.08
        20.792          1.318       6.989         2.077          218.98
        20.799          1.310       7.024         2.076          218.91
        20.804          1.301       7.060         2.076          218.87
        20.805          1.293       7.097         2.076          218.86
        28.890          1.293       7.097         2.076          218.86
-------------------------END OF HYDRAULIC JUMP ANALYSIS-------------------------
1  PRESSURE+MOMENTUM BALANCE OCCURS AT    12.55 FEET UPSTREAM OF NODE  1005.00 I
       DOWNSTREAM DEPTH = 2.146 FEET, UPSTREAM CONJUGATE DEPTH = 0.771 FEET I

  NODE   1009.00 : HGL  =  <  551.663>;EGL= <  552.446>;FLOWLINE= <  550.370>

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

  FLOW PROCESS FROM NODE  1009.00 TO NODE  1009.00 IS CODE =  8
  UPSTREAM NODE  1009.00     ELEVATION =   550.37  (FLOW UNSEALS IN REACH}

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       11.50 CFS        PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY  =  7.10  FEET/SEC .   VELOCITY HEAD  =  0.782 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.782) =  0.156

  NODE   1009.00 : HGL  =  <  552.602>;EGL= <  552.602>;FLOWLINE= <  550.370>

************************************************************************ ************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1009.00           FLOWLINE ELEVATION =    550.37
  ASSUMED UPSTREAM CONTROL HGL =     551.66 FOR DOWNSTREAM RUN ANALYSIS

=========================================================================== =
```

END OF GRADUALLY VARIED FLOW ANALYSIS

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
(Reference: LACFCD,LACRD, AND OCEMA HYDRAULICS CRITERION)
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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* **McMJ:LLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1061 TO 1071 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *

FILE NAME: A:/lOOOA.PIP
TIME/DATE OF STUDY: 15:53 09/28/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD (FT)	UPSTREAM RUN PRESSURE+ MOMENTUM (POUNDS	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
1061.00-		1.39*	91.03	0.59	63.50
	} FRICTION		HYDRAULIC JUMP		
1068.00-		0.79*Dc	56.58	0.79*Dc	56.58
	} JUNCTION				
1068.00-		1.08*	44.55	0.20	34.01
	} FRICTION		} HYDRAULIC JUMP		
1071.00-		0.47*Dc	15.57	0.47*Dc	15.57
	} CATCH BASIN				
1071.00-		0.67*	8.27	0.47 De	5.66

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 1061.00 FLOWLINE ELEVATION = 511.99
PIPE FLOW = 4.23 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 513.380 FEET

NODE 1061.00 : **HGL** = < 513.380>;EGL= < 513.475>;FLOWLINE= < 511.990>

FLOW PROCESS FROM NODE 1061.00 TO NODE 1068.00 IS CODE = 1
UPSTREAM NODE 1068.00 ELEVATION = 513.02 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 4.23 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 65.25 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.58 CRITICAL DEPTH(FT) = 0.79

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.79

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.788	4.495	1.102	56.58
0.016	0.780	4.555	1.102	56.59
0.067	0.772	4.615	1.103	56.62
0.155	0.764	4.678	1.104	56.67
0.285	0.755	4.742	1.105	56.74
0.460	0.747	4.808	1.106	56.83
0.686	0.739	4.876	1.109	56.94
0.969	0.731	4.946	1.111	57.07
1.315	0.723	5.018	1.114	57.23
1.732	0.715	5.092	1.117	57.41
2.231	0.706	5.168	1.121	57.61
2.822	0.698	5.247	1.126	57.84
3.520	0.690	5.328	1.131	58.10
4.343	0.682	5.411	1.137	58.38
5.313	0.674	5.497	1.143	58.69
6.458	0.666	5.585	1.150	59.02
7.817	0.657	5.676	1.158	59.39
9.441	0.649	5.770	1.167	59.78
11.401	0.641	5.868	1.176	60.21
13.804	0.633	5.968	1.186	60.67
16.812	0.625	6.072	1.197	61.16
20.699	0.617	6.179	1.210	61.69
25.978	0.608	6.289	1.223	62.25
33.802	0.600	6.404	1.237	62.85
47.870	0.592	6.522	1.253	63.49
65.250	0.592	6.525	1.253	63.50

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.39

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.390	2.474	1.485	91.03
1.519	1.366	2.503	1.463	88.71
3.020	1.342	2.536	1.442	86.45
4.504	1.318	2.571	1.420	84.25
5.971	1.294	2.609	1.399	82.11
7.419	1.270	2.651	1.379	80.04
8.849	1.246	2.696	1.358	78.03
10.260	1.221	2.744	1.338	76.09

```
        11.650          1.197       2.796          1.319           74.22
        13.018          1.173       2.851          1.300           72.43
        14.362          1.149       2.911          1.281           70.71
        15.679          1.125       2.974          1.263           69.07
        16.967          1.101       3.042          1.245           67.51
        18.223          1.077       3.114          1.228           66.04
        19.443          1.053       3.191          1.211           64.65
        20.622          1.029       3.273          1.195           63.36
        21.754          1.005       3.361          1.180           62.16
        22.835          0.981       3.455          1.166           61.07
        23.854          0.957       3.555          1.153           60.08
        24.804          0.933       3.662          1.141           59.20
        25.671          0.908       3.777          1.130           58.43
        26.440          0.884       3.901          1.121           57.79
        27.094          0.860       4.033          1.113           57.27
        27.608          0.836       4.176          1.107           56.89
        27.949          0.812       4.329          1.103           56.66
        28.075          0.788       4.495          1.102           56.58
        65.250          0.788       4.495          1.102           56.58
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
1  PRESSURE+MOMENTUM  BALANCE OCCURS AT    20.64  FEET UPSTREAM OF NODE 1061.00 |
       DOWNSTREAM DEPTH = 1.028 FEET, UPSTREAM CONJUGATE DEPTH = 0.594 FEET |

  NODE   1068.00  : HGL  =  <   513.808>;EGL= <   514.122>;FLOWLINE=  <   513.020>

**********************************    ****************************************
  FLOW  PROCESS  FROM  NODE   1068.00  TO  NODE   1068.00  IS  CODE =   5
  UPSTREAM  NODE   1068.00      ELEVATION  =    513.35   (FLOW IS SUBCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES) (DEGREES) ELEVATION ·DEPTH(FT.)  (FT/SEC)
     UPSTREAM        1.55     18.00      90.00     513.35       0.47         1.134
    DOWNSTREAM       4.23     18.00                513.02       0.79         4.497
    LATERAL  lt1     0.00      0.00       0.00       0.00       0.00         0.000
    LATERAL #2       0.00      0.00       0.00       0.00       0.00         0.000
       QS            2.68===Q5  EQUALS  BASIN  INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4) )/( (Al+A2)*16.l)+FRICTION  LOSSES
  UPSTREAM:     MANNING'S  N  =  0.01300;  FRICTION  SLOPE  =  0.00029
  DOWNSTREAM:   MANNING'S  N  =  0.01300;  FRICTION  SLOPE  =  0.00549
  AVERAGED  FRICTION  SLOPE  IN  JUNCTION  ASSUMED  AS  0.00289
  JUNCTION  LENGTH      4.00 FEET
  FRICTION LOSSES     0.012 FEET          ENTRANCE LOSSES     0.063 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    { 0.270)+( 0.063) =   0.332

  NODE   1068.00  : HGL  =  <   514.435>;EGL= <   514.455>;FLOWLINE=  <   513.350>

******************************************    **********************  *********
  FLOW PROCESS FROM NODE   1068.00 TO NODE   1071.00 IS CODE =   1
  UPSTREAM NODE   1071.00      ELEVATION  =    516.10   (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW            1.55 CFS      PIPE DIAMETER =   18.00 INCHES
```

PIPE LENGTH = 13.75 E"'EET MANNING'S N 0.013 00

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.19 CRITICAL DEPTH(FT) = 0.47

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.47

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE rROM CONTROL(FT)	HOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.467	3.299	0.636	15.57
0.003	0.456	3.411	0.637	15.58
0.012	0.445	3.531	0.639	15.63
0.027	0.434	3.659	0.642	15.71
0.051	0.422	3.796	0.646	15.83
0.084	0.411	3.941	0.652	15.99
0.127	0.400	4.097	0.661	16.19
0.182	0.389	4.264	0.671	16.43
0.251	0.377	4.444	0.684	16.72
0.336	0.366	4.637	0.700	17.06
0.441	0.355	4.846	0.720	17.46
0.569	0.344	5.071	0.743	17.92
0.724	0.333	5.316	0.772	18.45
0.912	0.321	5.583	0.806	19.05
1.141	0.310	5.873	0.846	19.73
1.420	0.299	6.191	0.894	20.50
1.762	0.288	6.540	0.952	21.38
2.186	0.276	6.924	1.021	22.38
2.716	0.265	7.350	1.105	23.50
3.391	0.254	7.822	1.205	24.78
4.268	0.243	8.350	1.326	26.23
5.448	0.232	8.942	1.474	27.88
7.116	0.220	9.610	1.655	29.77
9.695	0.209	10.368	1.879	31.94
13.750	0.200	11.085	2.109	34.01

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.08

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL (FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.085	1.132	1.105	44.55
0.119	1.060	1.161	1.081	42.56
0.237	1.035	1.191	1.057	40.62
0.354	1.011	1.224	1.034	38.74
0.471	0.986	1.258	1.010	36.92
0.588	0.961	1.296	0.987	35.16
0.703	0.936	1.335	0.964	33.46
0.818	0.912	1.378	0.941	31.83
0.932	0.887	1.424	0.919	30.26
1.044	0.862	1.474	0.896	28.76
1.156	0.838	1.527	0.874	27.33

```
          1.265          0.813          1.584          0.852          25.97
          1.374          0.788          I.647          0.830          24.68
          I.480          0.764          1.714          0.809          23.46
          1.584          0.739          1.787          0.789          22.31
          1.685          0.714          1.867          0.768          21.25
          1.783          0.690          1.954          0.749          20.26
          1.878          0.665          2.049          0.730          19.35
          1.968          0.640          2.154.         0.712          18.53
          2.052          0.615          2.269          0.695          17.79
          2.130          0.591          2.397          0.680          17.15
          2.200          0.566          2.538          0.666          16.61
          2.260          0.541          2.696          0.654          16.17
          2.308          0.517          2.873          0.645          15.85
          2.340          0.492          3.073          0.639          15.64
          2.352          0.467          3.299          0.636          15.57
         13.750          0.467          3.299          0.636          15.57
------------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
1 PRESSURE+MOMENTUM BALANCE OCCURS AT     0.69 FEET UPSTREAM OF NODE 1068.00 |
|       DOWNSTREAM DEPTH = 0.939 FEET, UPSTREAM CONJUGATE DEPTH = 0.201 FEET |

  NODE   1071.00 : HGL = <  516.567>;EGL= <  516.736>;FLOWLINE= <  516.100>

**************************************************************************** *****
  FLOW PROCESS FROM NODE  1071.00 TO NODE  1071.00 IS CODE =  8
  UPSTREAM NODE  1071.00     ELEVATION =   516.10   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD}:
  PIPE FLOW =        1.55 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY  =  3.30 FEET/SEC.    VELOCITY HEAD  =  0.169 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.169) =  0.034

  NODE   1071.00 : HGL = <  516.770>;EGL= <  516.770>;FLOWLINE= <  516.100>

****************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1071.00            FLOWLINE ELEVATION =   516.10
  ASSUMED UPSTREAM CONTROL HGL =    516.57 FOR DOWNSTREAM RUN ANALYSIS

================================================ =    ====   ===   ========
  END OF GRADUALLY VARIED FLOW ANALYSIS
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**************************************************************************
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                  Analysis prepared by:

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                    5620 Friars Road
               .San Diego, California 92110
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 ************************* DESCRIPTION OF STUDY *************************
* McMILLIN OTAY RANCH VILLAGE 7                                J-14531A *
 * PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1061 TO 1065)       *
 * 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT *
 ****************************************   ***************************

  FILE NAME: A:/lOOOB.PIP
  TIME/DATE OF STUDY: 15:46 09/28/2004

**************************************************************************
            GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                    NODAL POINT STATUS TABLE
              (Note: "*" indicates nodal point data used.)
                  UPSTREAM RUN                  DOWNSTREAM RUN
   NODE    MODEL   PRESSURE      PRESSURE+       FLOW        PRESSURE+
 NUMBER  PROCESS  HEAD(FT)   MOMENTUM(POUNDS)  DEPTH(FT)  MOMENTUM(POUNDS)
 1061.00-             1.39*          113.91       0.76       100.60
        ) FRICTION
 1062.00-             1.17*           98.87       0.96 De          92.94
        } JUNCTION
 1062.00-             1.32            74.68       0.30*            79.70
        } FRICTION
 1065.00-             0.68*Dc         38.61       0.68*Dc          38.61
        } CATCH BASIN
 1065.00-             0.99*           20.77       0.68 De          13.70

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**************************************************************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  1061.00          FLOWLINE ELEVATION =   511.99
 PIPE FLOW =       6.17 CFS      PIPE DIAMETER =  18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   513.380 FEET

 NODE  1061.00 : HGL = <  513.380>;EGL= <  513.582>;FLO'WLINE= <  511.990>

**************************************************************************
 FLOW PROCESS FROM NODE  1061.00 TO NODE  1062.00 IS CODE =  1
 UPSTREAM NODE  1062.00     ELEVATION =   512.15   (FLOW IS SUBCRITICAL)
```

```
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW           6.17 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =       3.25 FEET          MANNING'S N0.01300

  NORMAL DEPTH(FT) =      0.53           CRITICAL DEPTH(FT) =     0.96
==================== ================================= ====================
  DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.39
================ ,============== ======================== ==================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL( FT)           (FT)    (FT/SEC)     ENERGY{FT)     MOMENTUM(POUNDS)
          0.000          1.390      3.609          1.592           113.91
          0.300          1.373      3.639          1.579           112.43
          0.593          1.356      3.671          1.565           111.00
          0.880          1.338      3.706          1.552           109.62
          1.161          1.321      3.742          1.539           108.28
          1.435          1.304      3.782          1.526           106.99
          1.702          1.287      3.823          1.514           105.74
          1.962          1.270      3.867          1.502           104.55
          2.214          1.252      3.913          1.490           103.40
          2.459          1.235      3.962          1.479           102.30
          2.696          1.218      4.014          1.468           101.25
          2.925          1.201      4.068          1.458           100.26
          3.144          1.184      4.124          1.448            99.32
          3.250          1.175      4.154          1.443            98.87
 ---------------------------------------------------------------------------
  NODE  1062.00 : HGL = <  513.325>;EGL= <  513.593>;FLOWLINE= <  512.150>

****************************************************************************
  FLOW PROCESS FROM NODE  1062.00 TO NODE  1062.00 IS CODE =  5
  UPSTREAM NODE  1062.00     ELEVATION =   512.48   (FLOW IS SUBCRITICAL)
   (NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES)  (DEGREES) ELEVATION   DEPTH(FT.)  (FT/SEC)
     UPSTREAM        3.15      18.00       0.00     512.48       0.68       12.751
    DOWNSTREAM       6.17      18.00                512.15       0.96        4.156
    LATERAL #1       0.00       0.00       0.00       0.00       0.00        0.000
    LATERAL #2       0.00       0.00       0.00       0.00       0.00        0.000
       QS            3.02===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)  -
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.12353
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00377
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.06365
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES     0.255 FEET         ENTRANCE LOSSES     0.054 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 1.654)+( 0.054) =    1.708

  NODE  1062.00 : HGL = <  512.776>;EGL= <  515.301>;FLOWLINE= <  512.480>

****************** ***************************   ******************************
```

```
 FLOW PROCESS FROM NODE  1062.00 TO NODE  1065.00 IS CODE =  1
 UPSTREAM NODE  1065.00     ELEVATION =   516.20  (FLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          3.15 CFS      PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =      23.75 FEET          MANNING'S N     0.01300

 NORMAL DEPTH(FT) =      0.28          CRITICAL DEPTH(FT) =      0.68
=============================   ======= ==================+===============
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.68
================ ============================ ==================== ===========
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC       PRESSURE+
  CONTROL( FT)          (FT)    (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
         0.000         0.675      4.080         0.934           38.61
         0.005         0.660      4.208         0.935           38.64
         0.020         0.644      4.345         0.937           38.75
         0.048         0.628      4.491         0.941           38.94
         0.089         0.612      4.646         0.947           39.20
         0.146         0.596      4.811         0.956           39.55
         0.221         0.580      4.988         0.967           40.00
         0.316         0.565      5.177         0.981           40.54
         0.436         0.549      5.380         0.998           41.19
         0.584         0.533      5.599         1.020           41.96
         0.764         0.517      5.834         1.046           42.85
         0.984         0.501      6.088         1.077           43.87
         1.250         0.485      6.362         1.114           45.05
         1.572         0.469      6.660         1.159           46.39
         1.963         0.454      6.984         1.212           47.91
         2.438         0.438      7.338         1.274           49.64
         3.019         0.422      7.724         1.349           51.59
         3.735         0.406      8.149         1.438           53.79
         4.629         0.390      8.617         1.544           56.27
         5.763         0.374      9.135         1.671           59.08
         7.232         0.359      9.710         1.824           62.26
         9.200         0.343     10.352         2.008           65.87
        11.975         0.327     11.073         2.232           69.98
        16.249         0.311     11.885         2.506           74.67
        23.750         0.296     12.747         2.821           79.70
-------------------------------------------   ------------------------------
 NODE:  1065.00 : HGL = <  516.875>;EGL= <  517.134>;FLOWLINE= <  516.200>

*****************  ************************************************************
 FLOW PROCESS FROM NODE  1065.00 TO NODE  1065.00 IS CODE =  8
 UPSTREAM NODE  1065.00     ELEVATION =   516.20  (FLOW IS SUBCRITICAL)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       3.15 CFS         PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY  =  4.08 FEET/SEC.   VELOCITY HEAD  =  0.258 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.258) =  0.052

 NODE  1065.00 : HGL =  <  517.186>;EGL= <  517.186>;FLOWLINE= <  516.200>

****************************************   ******************** *************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  1065.00            FLOWLINE ELEVATION =   516.20
```

ASSUMED UPSTREAM CONTROL **HGL** = 516.88 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

```
PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A  *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1050 TO 1051)              *
*                                                                            *
* 50-YR STORM EVENT, ULTIMATE CONDITION                           BY: PT     *
 ****************************************************************************

  FILE NAME: A:/1000C.PIP
  TIME/DATE OF STUDY: 16:10 09/28/2004

****************** ******************************************  ****************
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                 (Note: "*" indicates nodal point data used.)
                      UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+          FLOW         PRESSURE+
  NUMBER  PROCESS   HEAD(FT)    MOMENTUM(POUNDS)   DEPTH(FT)    MOMENTUM(POUNDS)
 1050.00-             0.68*    14.40                 0.13              5.27
        ) FRICTION         } HYDRAULIC JUMP
 1051.00-             0.25*Dc          3.16         0.25*Dc           3.16
        ) CATCH BASIN
 1051.00-             0.35*            1.67         0.25 De           1.17

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**** **** ********************** ******** * ****************** ******* k * ** ***
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  1050.00          FLOWLINE ELEVATION =  523.33
 PIPE FLOW =     0.44 CFS       PIPE DIAMETER =   18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   524.010 FEET

 NODE  1050.00 : HGL = <  524.010>;EGL= <  524.015>;FLOWLINE= <  523.330>

******** *** * ****** * ******* * ******** **** k * ************ **  *** ** * ******* * ***
 FLOW PROCESS FROM NODE  1050.00 TO NODE  1051.00 IS CODE =  1
 UPSTREAM NODE  1051.00     ELEVATION =   523.96  (HYDRAULIC JUMP OCCURS)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          0.44 CFS     PIPE DIAMETER   18.00 INCHES
 PIPE LENGTH =      6.25 FEET          MANNING'S N     0.01300
```

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.12 CRITICAL DEPTH(FT) = 0.25

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.25

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.245	2.337	0.330	3.16
0.002	0.240	2.407	0.330	3.17
0.009	0.235	2.481	0.331	3.17
0.021	0.230	2.559	0.332	3.18
0.039	0.225	2.642	0.334	3.20
0.064	0.220	2.729	0.336	3.23
0.096	0.215	2.821	0.339	3.26
0.136	0.210	2.919	0.343	3.29
0.187	0.205	3.022	0.347	3.33
0.249	0.200	3.132	0.353	3.38
0.324	0.195	3.249	0.359	3.44
0.415	0.190	3.374	0.367	3.50
0.523	0.185	3.507	0.377	3.58
0.653	0.180	3.649	0.387	3.66
0.810	0.175	3.802	0.400	3.75
0.997	0.170	3.965	0.415	3.86
1.224	0.165	4.141	0.432	3.98
1.501	0.161	4.331	0.452	4.10
1.841	0.156	4.536	0.475	4.25
2.266	0.151	4.758	0.502	4.41
2.809	0.146	4.998	0.534	4.59
3.525	0.141	5.261	0.571	4.78
4.518	0.136	5.548	0.614	5.00
6.022	0.131	5.862	0.664	5.25
6.250	0.130	5.889	0.669	5.27

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.68

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT}	FLOW DEPTH (FT)	VELOCITY (FT/SEC}	SPECIFIC ENERGY(FT}	PRESSURE+ MOMENTUM(POUNDS}
0.000	0.680	0.565	0.685	14.40
0.169	0.663	0.584	0.668	13.59
0.338	0.645	0.605	0.651	12.80
0.507	0.628	0.627	0.634	12.05
0.675	0.610	0.651	0.617	11.32
0.842	0.593	0.677	0.600	10.62
1.009	0.576	0.704	0.583	9.95
1.176	0.558	0.734	0.567	9.32
1.341	0.541	0.766	0.550	8.71
1.505	0.523	0.801	0.533	8.13
1.669	0.506	0.839	0.517	7.58
1.831	0.489	0.880	0.501	7.06
1.992	0.471	0.925	0.485	6.57

```
          2.150          0.454          0.975          0.469          6.10
          2.307          0.437          1.029          0.453          5.67
          2.461          0.419          1.089          0.438          5.27
          2.611          0.402          1.156          0.422          4.91
          2.757          0.384          1.230          0.408          4.57
          2.899          0.367          1.313          0.394          4.26
          3.034          0.350          1.406          0.380          3.99
          3.160          0.332          1.512          0.368          3.75
          3.277          0.315          1.632          0.356          3.55
          3.379          0.297          1.770          0.346          3.39
          3.462          0.280          1.930          0.338          3.27
          3.521          0.263          2.117          0.332          3.19
          3.543          0.245          2.337          0.330          3.16
          6.250          0.245          2.337          0.330          3.16
-------------------------END OF HYDRAULIC JUMP ANALYSIS-------------------------
| PRESSURE+MOMENTUM BALANCE OCCURS AT      2.66 FEET UPSTREAM OF NODE 1050.00 |
        DOWNSTREAM DEPTH = 0.396 FEET, UPSTREAM CONJUGATE DEPTH = 0.140 FEET |

  NODE  1051.00 : HGL = <  524.205>;EGL= <  524.290>;FLOWLINE= <  523.960>

****************************************************************************
  FLOW PROCESS FROM NODE  1051.00 TO NODE  1051.00 IS CODE =  8
  UPSTREAM NODE  1051.00     ELEVATION =   523.96  (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       0.44 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  2.34 FEET/SEC.  VELOCITY HEAD =  0.085 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.085) =  0.017

  NODE  1051.00 : HGL =  <  524.307>;EGL= <  524.307>;FLOWLINE= <  523.960>

**********************************  ********************* ************** *******
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1051.00           FLOWLINE ELEVATION =   523.96
  ASSUMED UPSTREAM CONTROL HGL =    524.21 FOR DOWNSTREAM RUN ANALYSIS

==============================  ================================  ==============
  END OF GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared by:

RICK ENGINEERING COMPANY
5620 Friars Road
San Diego, California 92110
619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********

*** McMILLIN OTAY RANCH VILLAGE 7 J-14531A ***
*** PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1050 TO 1056 LATERAL) ***
*** 50-YR STORM EVENT, ULTIMATE CONDITION BY :PT ***

FILE NAME: A:/lOOOD.PIP
TIME/DATE OF STUDY: 16:14 09/28/2004

****

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
1050.00-	) FRICTION	0.68	27.43	0.42*	30.52
1053.00-	) JUNCTION	0.58*Dc	26.20	O.SB*Dc	26.20
1053.00-	) FRICTION	0.60	11.78	0.14*	13.26
1056.00-	▌ CATCH BASIN	0.32*Dc	6.10	0.32*Dc	6.10
1056.00-		0.45*	3.22	0.32 De	2.24

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

****

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 1050.00 FLOWLINE ELEVATION = 523.33
PIPE FLOW = 2.33 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 524.010 FEET

NODE 1050.00 : **HGL** = < 523.747>;EGL= < 524.27l>;FLOWLINE= < 523.330>

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

FLOW PROCESS FROM NODE 1050.00 TO NODE 1053.00 IS CODE ▌ 1
UPSTREAM NODE 1053.00 ELEVATION = 523.78 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCO):
PIPE FLOW 2.33 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 22.25 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.40 CRITICAL DEPTH(FT) = 0.58

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.58

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.577	3.717	0.792	26.20
0.011	0.570	3.779	0.792	26.21
0.046	0.563	3.843	0.793	26.23
0.108	0.556	3.909	0.793	26.26
0.199	0.549	3.978	0.795	26.31
0.321	0.542	4.048	0.796	26.37
0.480	0.535	4.121	0.799	26.45
0.678	0.528	4.196	0.801	26.54
0.922	0.521	4.274	0.804	26.65
1.216	0.514	4.355	0.808	26.78
1.567	0.506	4.438	0.813	26.92
1.985	0.499	4.524	0.817	27.08
2.479	0.492	4.614	0.823	27.26
3.062	0.485	4.706	0.829	27.46
3.751	0.478	4.802	0;837	27.68
4.566	0.471	4.902	0.845	27.91
5.534	0.464	5.006	0.853	28.17
6.692	0.457	5.113	0.863	28.46
8.094	0.450	5.225	0.874	28.76
9.814	0.443	5.341	0.886	29.09
11.971	0.436	5.462	0.899	29.45
14.764	0.429	5.588	0.914	29.83
18.564	0.422	5.719	0.930	30.24
22.250	0.417	5.807	0.941	30.52

NODE 1053.00 : **HGL** = < 524.357>;EGL= < 524.572>;FLOWLINE= < 523.780>

FLOW PROCESS FROM NODE 1053.00 TO NODE 1053.00 IS CODE = 5
UPSTREAM NODE 1053.00 ELEVATION = 524.28 (FLOW IS SUBCRITICAL)
(NOTE: POSSIBLE JOMP IN OR UPSTREAM OF STRUCTURE)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	0.74	18.00	90.00	524.28	0.32	9.050
DOWNSTREAM	2.33	18.00		523.78	0.58	3.718
LATERAL #1	0.00	0.00	0.00	0.00	0.00	0.000
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	l.59===Q5 EQUALS BASIN INPOT===					

LACFCO AND OCEMA FLOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/{(Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.15948

```
  DOWNSTREAM:   MANNING'S  N  =  0.01300;  FRICTION SLOPE = 0.00500
  AVERAGED  FRICTION  SLOPE  IN  JUNCTION ASSUMED AS 0.08224
  JUNCTION  LENGTH     4.00 FEET
  FRICTION  LOSSES     0.329 FEET          ENTRANCE  LOSSES     0.043 FEET
  JUNCTION LOSSES    {DY+HV1-HV2)+(ENTRANCE  LOSSES)
  JUNCTION LOSSES    ( 1.076)+( 0.043) =   1.118

  NODE   1053.00  : HGL = <   524.419>;EGL= <   525.690>;FLOWLINE=  <   524.280>

************************************************************    ****************
  FLOW PROCESS FROM NODE   1053.00 TO NODE   1056.00 IS CODE =   1
  UPSTREAM NODE   1056.00     ELEVATION =    532.20   (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW           0.74 CFS      PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =       40.95 FEET           MANNING'S N     0.01300

  NORMAL DEPTH(FT) =       0.13           CRITICAL DEPTH(FT) =       0.32
============================ ========================================== ====
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.32
================================     ========================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       FLOW DEPTH   VELOCITY       SPECIFIC        PRESSURE+
   CONTROL (FT)           (FT)     (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
          0.000          0.320       2.686          0.432              6.10
          0.002          0.312       2.778          0.432              6.10
          0.008          0.305       2.877          0.433              6.12
          0.019          0.297       2.981          0.435              6.15
          0.035          0.290       3.092          0.438              6.20
          0.057          0.282       3.211          0.442              6.26
          0.086          0.275       3.337          0.448              6.33
          0.123          0.267       3.473          0.455              6.43
          0.170          0.260       3.618          0.463              6.54
          0.228          0.252       3.774          0.473              6.67
          0.298          0.245       3.942          0.486              6.82
          0.384          0.237       4.124          0.501              6.99
          0.488          0.230       4.320          0.520              7.19
          0.614          0.222       4.533          0.541              7.42
          0.767          0.215       4.764          0.567              7.68
          0.953          0.207       5.016          0.598              7.97
          1.181          0.200       5.293          0.635              8.30
          1.462          0.192       5.596          0.679              8.67
          1.812          0.185       5.930          0.731              9.09
          2.257          0.177       6.300          0.794              9.56
          2.833          0.170       6.711          0.870             10.10
          3.605          0.162       7.170          0.961             10.71
          4.693          0.155       7.685          1.072             11.40
          6.368          0.147       8.265          1.209             12.19
          9.499          0.140       8.925          1.377             13.09
         40.950          0.138       9.048          1.410             13.26
--------------------------------------------------------------------------------
  NODE   1056.00 : HGL = <   532.520>;EGL= <   532.632>;FLOWLINE   <   532.200>

********************************************************************************
  FLOW PROCESS FROM NODE   1056.00 TO NODE   1056.00 IS CODE =   8
  UPSTREAM NODE   1056.00     ELEVATION =    532.20   (FLOW IS SUBCRITICAL)
```

```
  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       0.74 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =   2.69 FEET/SEC.    VELOCITY HEAD =  0.112 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.112) =  0.022

  NODE   1056.00  : HGL = <  532.654>;EGL= <  532.654>;FLOWLINE= <  532.200>

********************* ************** ********.****************************** *
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1056.00           FLOWLINE ELEVATION =   532.20
  ASSUMED UPSTREAM CONTROL HGL =    532.52 FOR DOWNSTREAM RUN ANALYSIS

=======================================================  ==============
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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Analysis prepared by:

RICK ENGINEERING COMPANY
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********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS ST BASIN 1000 (NODE 1014 TO 1015 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *
****

FILE NAME: A:/lOOOE.PIP
TIME/DATE OF STUDY: 16:16 09/28/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT}	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
1014.00-		1.03*	37.72	0.19	11.67
	}FRICTION		)HYDRAULIC JUMP		
1015.00-		0.35*Dc	7.37	0.35*Dc	7.37
	} CATCH BASIN				
1015.00-		0.49*	3.90	0.35 De	2.71

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 1014.00 FLOWLINE ELEVATION = 545.60
PIPE FLOW = 0.86 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 546.630 FEET

NODE 1014.00 : **HGL** = < 546.630>;EGL= < 546.637>;FLOWLINE= < 545.600>

FLOW PROCESS FROM NODE 1014.00 TO NODE 1015.00 IS CODE = 1
UPSTREAM NODE 1015.00 ELEVATION = 546.23 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 0.86 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 6.25 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.17 CRITICAL DEPTH(FTJ = 0.35

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.35

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM[POUNDS)
0.000	0.345	2.798	0.467	7.37
0.003	0.338	2.883	0.467	7.38
0.013	0.331	2.972	0.468	7.40
0.031	0.324	3.066	0.470	7.42
0.057	0.316	3.166	0.472	7.47
0.093	0.309	3.271	0.476	7.52
0.140	0.302	3.383	0.480	7.59
0.200	0.295	3.501	0.485	7.68
0.274	0.288	3.627	0.492	7.78
0.365	0.281	3.760	0.500	7.90
0.475	0.273	3.903	0.510	8.04
0.608	0.266	4.055	0.522	8.19
0.769	0.259	4.218	0.535	8.37
0.961	0.252	4.392	0.552	8.57
1.192	0.245	4.579	0.571	8.80
1.470	0.238	4.780	0.593	9.05
1.806	0.230	4.997	0.618	9.33
2.216	0.223	5.231	0.648	9.65
2.722	0.216	5.485	0.684	10.00
3.356	0.209	5.761	0.725	10.39
4.166	0.202	6.061	0.773	10.83
5.238	0.195	6.389	0.829	11.31
6.250	0.190	6.630	0.873	11.67

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.03

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.030	0.665	1.037	37.72
0.268	1.003	0.685	1.010	35.58
0.535	0.975	0.707	0.983	33.50
0.802	0.948	0.731	0.956	31.50
1.068	0.920	0.756	0.929	29.56
1.334	0.893	0.784	0.903	27.70
1.599	0.866	0.814	0.876	25.91
1.863	0.838	0.846	0.849	24.19
2.125	0.811	0.882	0.823	22.55
2.387	0.783	0.921	0.797	20.98
2.647	0.756	0.963	0.770	19.49
2.905	0.729	1.010	0.745	18.08
3.162	0.701	1.061	0.719	16.74
3.415	0.674	1.117	0.693	15.49
3.666	0.646	1.180	0.668	14.31

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          3.913          0.619          1.249          0.643          13.22
          4.155          0.592          1.327          0.619          12.20
          4.392          0.564          1.414          0.595          11.28
          4.621          0.537          1.513          0.572          10.43
          4.841          0.510          1.625          0.551           9.68
          5.048          0.482          1.753          0.530           9.03
          5.240          0.455          1.900          0.511           8.47
          5.410          0.427          2.072          0.494           8.01
          5.550          0.400          2.273          0.480           7.67
          5.649          0.373          2.512          0.471           7.45
          5.688          0.345          2.798          0.467           7.37
          6.250          0.345          2.798          0.467           7.37
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
 PRESSURE+MOMENTUM BALANCE OCCURS AT     5.16 FEET UPSTREAM OF NODE 1014.00
       DOWNSTREAM DEPTH = 0.466 FEET, UPSTREAM CONJUGATE DEPTH = 0.248 FEET

  NODE  1015.00 : HGL = <  546.575>;EGL= <  546.697>;FLOWLINE= <  546.230>

************************************  ***************************************
  FLOW PROCESS FROM NODE  1015.00 TO NODE  1015.00 IS CODE =  8
  UPSTREAM NODE  1015.00     ELEVATION =   546.23   (FLOW IS SUBCRITICAL}

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD} :
  PIPE FLOW =       0.86 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =   2.80              VELOCITY HEAD =  0.122 FEET
  FEET/SEC.
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD} = .2*(  0.122) =  0.024

  NODE  1015.00 : HGL = <  546.721>;EGL= <  546.721>;FLOWLINE= <  546.230>

***************** ********** ********************************************  **
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1015.00            FLOWLINE ELEVATION =   546.23
  ASSUMED UPSTREAM CONTROL HGL =    546.58 FOR DOWNSTREAM RUN ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared by:

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619-291-0707 Fax 619-291-4165

```
************************* DESCRIPTION OF STUDY *************************
* McMILLIN OTAY RANCH VILLAGE 7                                J-14531A *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1014 TO 1017)        *
*                                                                      *
* 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT *
************************************************************************
```

FILE NAME: A:/lOOOF.PIP
TIME/DATE OF STUDY: 16:18 09/28/2004

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**************************************************************************
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GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
1014.00-	) FRICTION	1.03	69.01	0.61*	72.40
1017.00-	} CATCH BASIN	0.83*Dc	64.02	0.83*Dc	64.02
1017.00-		1.23*	35.13	0.83 De	22.14

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

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**********************************  ********************** **********
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DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 1014.00 FLOWLINE ELEVATION = 545.60
PIPE FLOW = 4.65 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 546.630 FEET

NODE 1014.00 : **HGL** = < 546.215>;EGL= < 546.937>;FLOWLINE= < 545.600>

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**********************************  ****************************************
```

FLOW PROCESS FROM NODE 1014.00 TO NODE 1017.00 IS CODE = 1
UPSTREAM NODE 1017.00 ELEVATION = 546.05 {FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 4.65 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 22.25 FEET MANNING'S N 0.01300

```
  NORMAL  DEPTH(FT) =      0.57           CRITICAL  DEPTH(FT)        0.83
============================================================   =============
  UPSTREAM  CONTROL  ASSUMED  FLOWDEPTH(FT) =     0.83
================================  ===========  == ==========  =====  =========
  GRADUALLY  VARIED  FLOW  PROFILE  COMPUTED  INFORMATION:

  DISTANCE  FROM       FLOW  DEPTH   VELOCITY      SPECIFIC         PRESSURE+
   CONTROL(FT)             (FT)     (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
          0.000           0.828       4.646          1.164             64.02
          0.017           0.818       4.717          1.164             64.04
          0.069           0.808       4.791          1.164             64.08
          0.161           0.798       4.867          1.166             64.16
          0.296           0.788       4.946          1.168             64.27
          0.478           0.777       5.027          1.170             64.41
          0.714           0.767       5.111          1.173             64.59
          1.010           0.757       5.198          1.177             64.80
          1.372           0.747       5.288          1.181             65.05
          1.810           0.737       5.381          1.187             65.34
          2.333           0.727       5.477          1.193             65.67
          2.955           0.717       5.577          1.200             66.03
          3.691           0.706       5.681          1.208             66.44
          4.560           0.696       5.788          1.217             66.90
          5.587           0.686       5.899          1.227             67.40
          6.801           0.676       6.015          1.238             67.95
          8.245           0.666       6.135          1.251             68.55
          9.973           0.656       6.260          1.265             69.20
         12.064           0.646       6.390          1.280             69.90
         14.631           0.635       6.525          1.297             70.66
         17.853           0.625       6.665          1.316             71.48
         22.024           0.615       6.811          1.336             72.36
         22.250           0.615       6.817          1.337             72.40
-------------------------------------------------------------------------------
  NODE   1017.00 : HGL = <  546.878>;EGL= <  547.214>;FLOWLINE= <  546.050>

**********************************************************  *********  k  *********  *****

  FLOW PROCESS FROM NODE  1017.00 TO NODE  1017.00 IS CODE =  8
  UPSTREAM NODE  1017.00     ELEVATION =   546.05   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       4.65 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW  VELOCITY  =  4.65  FEET/SEC.  VELOCITY  HEAD  =  0.335 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.335) =  0.067

  NODE   1017.00 : HGL = <  547.281>;EGL= <  547.281>;FLOWLINE= <  546.050>

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

  UPSTREAM PIP FLOW CONTROL DATA:
  NODE NUMBER =  1017.00           FLOWLINE ELEVATION =   546.05
  ASSUMED UPSTREAM CONTROL HGL =    546.88 FOR DOWNSTREAM  RUN  ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
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********************************************************************** **********
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                              Analysis prepared by:

                            RICK ENGINEERING  COMPANY
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                              San Diego, California 92110
                            619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
  * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1005 TO 1006)           *
  * 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT    *
 ********************   ***********************************************

  FILE NAME: A:/lOOOG.PIP
  TIME/DATE Of STUDY: 16:21 09/28/2004

**************************************************************************
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                 (Note: "*n indicates nodal point data used.)
                      UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL   PRESSURE       PRESSURE+          FLOW          PRESSURE+
 NUMBER   PROCESS   HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOMENTUM(POUNDS)
 1005.00-              3.25*   294.56                  0.38              99.32
        } FRICTION
 1006.00-              1.41*            91.92         0.78 De           55.19
        } CATCH BASIN
 1006.00-              1.52*            84.37         0.78 De           19.26

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**************************************************************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  1005.00           FLOWLINE ELEVATION =  547.48
 PIPE FLOW =     4.15 CFS       PIPE DIAMETER =   18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   550.730 FEET

 NODE  1005.00 : HGL = <  550.730>;EGL= <  550.816>;FLOWLINE= <  547.480>

**************************************************************************
 FLOW PROCESS FROM NODE  1005.00 TO NODE  1006.00 IS CODE =  1
 UPSTREAM NODE  1006.00    ELEVATION =   549.33  {FLOW SEALS IN REACH)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW           4.15 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =       7.39 FEET          MANNING'S N     0.01300
==========================================================  ==  ====================
```

```
 DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     3.25

 PRESSURE FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      PRESSURE   VELOCITY     SPECIFIC       PRESSURE+
  CONTROL(FT)       HEAD(FT)   (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
        0.000         3.250      2.348         3.336          294.56
        7.034         1.500      2 348         1.586          101.59

 NORMAL DEPTH(FT) =     0.29          CRITICAL DEPTH(FT) =     0.78
============== ================== ========== ============================
 ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =     1.50
============================================    =============== =========
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC       PRESSURE+
  CONTROL(FT)         (FT)     (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
        7.034         1.500      2.348         1.586          101.59
        7.147         1.471      2.358         1.558           98.51
        7.257         1.442      2.378         1.530           95.51
        7.365         1.414      2.403         1.503           92.60
        7.390         1.407      2.410         1.497           91.92

 NODE  1006.00 : HGL = <  550.737>;EGL=<  550.827>;FLOWLINE= <  549.330>

**************************************************  ******************** **"****
 FLOW PROCESS FROM NODE  1006.00 TO NODE  1006.00 IS CODE =  8
 UPSTREAM NODE  1006.00     ELEVATION =   549.33   (FLOW UNSEALS IN REACH)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       4 .15 CFS         PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =  2.41 FEET/SEC.   VELOCITY HEAD =  0.090 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD} = .2*(  0.090) =  0.018

 NODE  1006.00 : HGL = <  550.845>;EGL= <  550.845>;FLOWLINE= <  549.330>

**** ************************************************** ********************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  1006.00           FLOWLINE ELEVATION =   549.33
 ASSUMED UPSTREAM CONTROL HGL =    550.11 FOR DOWNSTREAM RUN ANALYSIS

============= ============= ========== ============== ================ ===
 END OF GRADUALLY VARIED FLOW ANALYSIS
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**********************************************************************  *****
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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
  * McMILLIN OTAY RANCH VILLAGE 7                                J-14531A *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1005 TO 1009 LATERAL)  *
* 50-YR STORM EVENT, ULTIMATE CONDITION                           BY:PT *
  ****************************************************  ********************

   FILE NAME: A:/lOOOH .PIP
   TIME/DATE OF STUDY: 16:23 09/28/2004

**************************************************************************************
                GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                          NODAL POINT STATUS TABLE
                 (Note: "*" indicates nodal point data used.)
                          UPSTREAM RUN                    DOWNSTREAM RUN
    NODE     MODEL   PRESSURE       PRESSURE+          FLOW          PRESSURE+
  NUMBER   PROCESS  HEAD(FT)   MOMENTUM( POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
  1005.00-              3.25*             420.70        0.70    330.39
         } FRICTION          ) HYDRAULIC JUMP
  1009.00-              l.29*Dc           218.86        1.29*Dc          218.86
         } CATCH BASIN
       1009.00-              2.23*            163.43        1.29 De            60.64

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1005.00            FLOWLINE ELEVATION =   547.48
  PIPE FLOW =      11.50 CFS        PIPE DIAMETER =  18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   550.730 FEET

  NODE  1005.00 : HGL = <  550.730>;EGL= <  551.388>;FLOWLINE= <  547.480>

 ********************************************************** **********************
  FLOW PROCESS FROM NODE  1005.00 TO NODE  1009.00 IS CODE =  1
  UPSTREAM NODE  1009.00     ELEVATION =   550.37  (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACcCD):
  PIPE FLOW          11.50 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =      28.89 FEET          MANNING'S N     0.01300
```

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.61 CRITICAL DEPTH(FT) = 1.29

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) 1.29

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	fLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.293	7.097	2.076	218.86
0.017	1.266	7.227	2.077	219.01
0.070	1.238	7.368	2.082	219.47
0.162	1.211	7.521	2.090	220.25
0.297	1.183	7.687	2.102	221.36
0.479	1.156	7.866	2.118	222.82
0.716	1.129	8.059	2.138	224.65
1.013	1.101	8.267	2.163	226.88
1.379	1.074	8.490	2.194	229.52
1.824	1.047	8.731	2.231	232.62
2.361	1.019	8.991	2.275	236.19
3.004	0.992	9.271	2.327	240.27
3.774	0.965	9.572	2.388	244.91
4.693	0.937	9.898	2.460	250.16
5.793	0.910	10.251	2.542	256.07
7.113	0.882	10.632	2.639	262.70
8.706	0.855	11.046	2.751	270.11
10.645	0.828	11.496	2.881	278.40
13.032	0.800	11.986	3.033	287.66
16.018	0.773	12.522	3.209	297.98
19.839	0.746	13.107	3.415	309.51
24.889	0.718	13.751	3.656	322.39
28.890	0.703	14.146	3.812	330.39

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 3.25

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	3.250	6.508	3.908	420.70
19.875	1.500	6.508	2.158	227.73

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL (FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
19.875	1.500	6.506	2.158	227.73
19.959	1.492	6.510	2.150	226.92
20.033	1.483	6.518	2.144	226.19
20.102	1.475	6.529	2.138	225.52
20.166	1.467	6.542	2.132	224.89
20.225	1.459	6.556	2.126	224.31

```
        20.282          1.450       6.572          2.121          223.76
        20.334          1.442       6.590          2.117          223.24
        20.384          1.434       6.608          2.112          222.76
        20.430          1.425       6.628          2.108          222.31
        20.474          1.417       6.650          2.104          221.89
        20.514          1.409       6.672          2.101          221.50
        20.552          1.401       6.696          2.097          221.13
        20.587          1.392       6.720          2.094          220.79
        20.620          1.384       6.746          2.091          220.49
        20.649          1.376       6.773          2.088          220.20
        20.676          1.367       6.801          2.086          219.95
        20.700          1.359       6.830          2.084          219.72
        20.722          1.351       6.859          2.082          219.52
        20.740          1.343       6.890          2.080          219.35
        20.756          1.334       6.922          2.079          219.20
        20.770          1.326       6.955          2.078          219.08
        20.780          1.318       6.989          2.077          218.98
        20.787          1.310       7.024          2.076          218.91
        20.792          1.301       7.060          2.076          218.87
        20.793          1.293       7.097          2.076          218.86
        28.890          1.293       7.097          2.076          218.86
------------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
 PRESSURE+MOMENTUM BALANCE OCCURS AT    12.53 FEET UPSTREAM OF NODE 1005.00
       DOWNSTREAM DEPTH = 2.146 FEET, UPSTREAM CONJUGATE DEPTH = 0.771 FEET

  NODE   1009.00 : HGL =<  551.663>;EGL=<  552.446>;FLOWLINE=<  550.370>

****************************************************************************
  FLOW PROCESS FROM NODE  1009.00 TO NODE  1009.00 IS CODE =  8
  UPSTREAM NODE  1009.00     ELEVATION =   550.37  (FLOW UNSEALS IN REACH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD};
  PIPE FLOW =       11.50 CFS        PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  7.10 FEET/SEC.  VELOCITY HEAD =  0.782 FEET
  CATCH BASIN ENERGY LOSS = .2*{VELOCITY HEAD) = .2*{  0.782) =  0.156

  NODE   1009.00 : HGL =<  552.602>;EGL=<  552.602>;FLOWLINE=<  550.370>

***********  ************************************************************  ***
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1009.00           FLOWLINE ELEVATION =   550.37
  ASSUMED UPSTREAM CONTROL HGL =    551.66 FOR DOWNSTREAM RUN ANALYSIS

=========  ==================== ========================== ==================
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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Analysis prepared by:

RICK ENGINEERING COMPANY
5620 Friars Road
San Diego, California 92110
619-291-0707 Fax 619-291-4165

DESCRIPTION OF STUDY

McMILLIN OTAY RANCH VILLAGE 7 **J-14531A**
PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1025 TO 1027 LATERAL)
50-YR STORM EVENT, ULTIMATE CONDITION **BY:PT**

FILE NAME: A:/lOOOI.PIP
TIME/DATE OF STUDY: 15:18 09/28/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UP$TREAM RUN PRESSURE HEAD(FT)	UP$TREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
1025.00-		4.82*	738.73	1.43 De	369.94
	} FRICTION				
1026.00-		5.60*	825.02	1.43 De	369.94
	} JUNCTION				
1026.00-		7.97*	902.03	0.97	187.68
	} FRICTION				
1030.00-		7.71*	873.41	1.21 De	175.33
	} CATCH BASIN				
1030.00-		8.29*	830.94	1.21 De	52.48

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 1025.00 FLOWLINE ELEVATION = 527.20
PIPE FLOW = 16.26 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** 532.020 FEET

NODE 1025.00 : **HGL** = < 532.020>;EGL= < 533.335>;FLOWLINE= < 527.200>

FLOW PROCESS FROM NODE 1025.00 TO NODE 1026.00 IS CODE = 1
UPSTREAM NODE 1026.00 ELEVATION = 527.68 (FLOW IS UNDER PRESSURE)

```
 CALCULATE FRICTION LOSSES(LACFCD}:
 PIPE FLOW          16.26 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH        52.69 FEET          MANNING'S N     0.01300
 SF=(Q/K)**2   ((     16.26)/(   105.043))**2 = 0.02396
 HF=L*SF = (     52.69)*(0.02396) =      1.263

 NODE  1026.00 : HGL = <  533.283>;EGL= <  534.597>;FLOWLINE= <  527.680>

**********************************************  ************* ***************
 FLOW PROCESS FROM NODE  1026.00 TO NODE  1026.00 IS CODE =  5
 UPSTREAM NODE  1026.00     ELEVATION =   528.01   (FLOW IS UNDER PRESSURE)

 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE   CRITICAL    VELOCITY
                 (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)  (FT/SEC)
    UPSTREAM       9.84     18.00      90.00     528.01       1.21         5.568
   DOWNSTREAM     16.26     18.00                527.68       1.43         9.201
   LATERAL n       6.42     18.00      90.00     528.01       0.98         3.633
   LATERAL #2      0.00      0.00       0.00       0.00       0.00         0.000
      Q5           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY={Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)  -
     Q4*V4*COS(DELTA4) )/( (AL+A2)*16.l)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00877
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02396
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01637
 JUNCTION LENGTH     4.00 FEET
 FRICTION LOSSES    0.065 FEET         ENTRANCE LOSSES    0.000 FEET
 JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION  LOSSES   ( 1.862)+( 0.000) =   1.862

 NODE  1026.00 : HGL = <  535.977>;EGL= <  536.459>;FLOWLINE= <  528.010>

*************************************************************************
 FLOW PROCESS FROM NODE  1026.00 TO NODE  1030.00 IS CODE =  1
 UPSTREAM NODE  1030.00     ELEVATION =   528.47   (FLOW IS UNDER PRESSURE)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          9.84 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH       22.84 FEET          MANNING'S N     0.01300
 SF={Q/K)**2   ((     9.84)/(   105.039))**2 =
 HF=L*SF = (     0.00878 22.84)*(0.00878) =      0.200

 NODE  1030.00 : HGL = <  536.178>;EGL= <  536.659>;FLOWLINE= <  528.470>

*********************************************************** **************
 FLOW PROCESS FROM NODE  1030.00 TO NODE  1030.00 IS CODE =  8
 UPSTREAM NODE  1030.00     ELEVATION =   528.47   (FLOW IS UNDER PRESSURE)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD) :
 PIPE FLOW =       9.84 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =  5.57 FEET/SEC .  VELOCITY HEAD =  0.482 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.482) =  0.096

 NODE  1030.00 : HGL = <  536.755>;EGL= <  536.755>;FLOWLINE= <  528.470>
```

```
**************************************   *********************************    -
  UPSTREAM PIPE FLOW CONTROL DATA;
  NODE NUMBER =  1030.00           FLOWLINE ELEVATION =   528.47
  ASSUMED UPSTREAM CONTROL HGL =    529.68 FOR DOWNSTREAM RUN ANALYSIS

======================================   ===     ==   ==========   - ====
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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**************************************************************************
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                          Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                            San Diego, California 92110
                          619-291-0707    Fax 619-291-4165

 ************************* DESCRIPTION OF STODY *************************
* McMILLIN OTAY RANCH VILLAGE 7                                J-14531A  *
 * PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1026 TO 1027 LATERAL)  *
 * 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT   *
 ****************************   ****************************************

  FILE.NAME; A:/lOOOJ.PIP
  TIME/DATE OF STUDY: 16:28 09/28/2004

**********************************************************   ******************
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                  (Note: "*" indicates nodal point data used.)
                        UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+          FLOW          PRESSURE+
  NUMBER   PROCESS  HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
 1026.00-              7.97*          842.34        0.63            126.63
        } FRICTION
 1027.00-              7.36*          775.50        0.99 De          99.42
        | CATCH BASIN
 1027.00-              7.62*          757.02        0.99 De          33.09

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**********************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1026.00          FLOWLINE ELEVATION =  528.01
  PIPE FLOW =       6.49 CFS      PIPE DIAMETER =   18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   535.980 FEET

  NODE  1026.00 : HGL = <  535.980>;EGL= <  536.189>;FLOWLINE= <  528.010>

**************************************************************************
  FLOW PROCESS FROM NODE  1026.00 TO NODE  1027.00 IS CODE =  1
  UPSTREAM NODE  1027.00     ELEVATION =   528.64  (FLOW IS UNDER PRESSURE)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          6.49 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH        6.25 FEET          MANNING'S N      0.01300
  SF=(Q/K)**2    ((      6.49)/(   105.028))**2=0.00382
```

```
  HF=L*SF = (      6.25)*(0.00382) =      0.024

  NODE   1027.00 : HGL = <  536.004>;EGL= <  536.213>;FLOWLINE= <  528.640>

****************************************************************************
  FLOW PROCESS FROM NODE  1027.00 TO NODE  1027.00 IS CODE =  8
  UPSTREAM NODE  1027.00     ELEVATION =   528.64  (FLOW IS UNDER PRESSURE)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       6.49 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =   3.67 FEET/SEC.    VELOCITY HEAD =  0.21D FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.210) =  0.042

  NODE   1027.00 : HGL = <  536.255>;EGL= <  536.255>;FLOWLINE= < 528.640>

****************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1027 .00           FLOWLINE ELEVATION =   528.64
  ASSUMED UPSTREAM CONTROL HGL =    529.63 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

```
**************************************************************************
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                              Analysis  prepared  by:

                            RICK  ENGINEERING  COMPANY
                                5620 Friars Road
                              San Diego, California  92110
                            619-291-0707    Fax  619-291-4165

  ************************** DESCRIPTION OF STUDY ************************
   * McMILLIN  OTAY  RANCH  VILLAGE  7                                J-14531A *
   * PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1035 TO 1036 LATERAL)  *
 * 50-YR STORM EVENT, ULTIMATE CONDITION                                BY:PT *
  ****** ****** ********** ********** ********** ******** ******* *"k ******

   FILE NAME: A:/lOOOK.PIP
   TIME/DATE OF STUDY: 16:33 09/28/2004

**************************  ********************* ********** *** ***************
                GRADUALLY VARIED  FLOW ANALYSIS  FOR  PIPE SYSTEM
                          NODAL POINT STATUS TABLE
                  (Note: "*" indicates nodal point data used.)
                        UPSTREAM RUN                    DOWNSTREAM  RUN
    NODE     MODEL   PRESSURE        PRESSURE+          FLOW          PRESSURE+
  NUMBER   PROCESS   HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOMENTUM( POUNDS)
  1035.00-              5.03*             475.70         0.30         28.66
         ) FRICTION
        1036.00-             4.40*            406.45        0.51 De            19.51
         ) CATCH BASIN
        1036.00-             4.42*            404.95        0.51 De             7.06

  MAXIMUM  NUMBER  OF  ENERGY  BALANCES  USED  IN  EACH  PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**********************  **************  ************************************
  DOWNSTREAM  PIPE  FLOW  CONTROL  DATA:
  NODE NUMBER =  1035.00            FLOWLINE ELEVATION =   527.88
  PIPE FLOW =       1.85 CFS        PIPE DIAMETER =  18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   532.910 FEET

  NODE   1035.00 : HGL = <  532.910>;EGL= <  532.927>;FLOWLINE= <  527.880>

*******************  *********************  ***************** *************** *
  FLOW  PROCESS  FROM  NODE  1035.00 TO NODE  1036.00 IS CODE =  1
  UPSTREAM  NODE  1036.00     ELEVATION =   528.51   (FLOW IS UNDER PRESSURE)

  CALCULATE  FRICTION  LOSSES(LACFCD):
  PIPE  FLOW           1.85  CFS     PIPE  DIAMETER =  18.00  INCHES
  PIPE  LENGTH         6.25  FEET          MANNING'S N 0.01300
  SF=(Q/K)**2    ((      1.85)/(   104.652))**2 = 0.00031
```

```
  HF=L*SF = (      6.25}*(0.00031) =      0.002

  NODE  1036.00 : HGL = <  532.912>;EGL= <  532.929>;FLOWLINE= <  528.510>

*********** ****************************************  ***********************
  FLOW PROCESS FROM NODE  1036.00 TO NODE  1036.00 IS CODE =  8
  UPSTREAM NODE  1036.00     ELEVATION =   528.51   (FLOW IS UNDER PRESSURE}

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD} :
  PIPE FLOW =        1.85 CFS        PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  1.04 FEET/SEC.  VELOCITY HEAD =  0.017 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.017) =  0.003

  NODE  1036.00 : HGL = <  532.932>;EGL= <  532.932>;FLOWLINE= <  528.510>

************************** .***************************** *********************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1036.00            FLOWLINE ELEVATION =   528.51
  ASSUMED UPSTREAM CONTROL HGL =    529.02 FOR DOWNSTREAM RUN ANALYSIS

=========================================================== ====================
  END OF GRADUALLY VARIED FLOW ANALYSIS
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**********************************************************************  '*********

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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                            San Diego, California 92110
                           619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************'************
* McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1035 TO 1039 LATERAL)    *
* 50-YR STORM EVENT, ULTIMATE CONDIITON                          BY:PT    *
 ************************************************************************

  FILE NAME: A:/lOOOL.PIP
  TIME/DATE OF STUDY:  16:38 09/28/2004

**************************** ***************** ************ *********•k ****** * * **

               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                  (Note: "*" indicates nodal point data used.)
                       UPSTREAM  RUN                  DOWNSTREAM  RUN
    NODE     MODEL    PRESSURE      PRESSURE+          FLOW          PRESSURE+
   NUMBER   PROCESS   HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOMENTUM( POUNDS)
  1035.00-              5.03*            514.79         0.74              104.63
         } FRICTION
  1039.00-              4.67*            474.95         0.97 De            94.55
         } CATCH BASIN
  1039.00-              4.90*            457.81         0.97 De            31.64

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1035.00            FLOWLINE ELEVATION =   527.88
  PIPE FLOW =       6.25 CFS        PIPE DIAMETER =  18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   532.910 FEET

  NODE  1035.00 : HGL = <  532.910>;EGL= <  533.104>;FLOWLINE= <  527.880>

**********************************************************************    *****
  FLOW PROCESS FROM NODE  1035.00 TO NODE  1039.00 IS CODE =  l
  UPSTREAM  NODE  1039 .00     ELEVATION =   528.32  (FLOW IS UNDER PRESSURE)

  CALCULATE FRICTION LOSSES(LACFCD) :
  PIPE FLOW           6.25 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH        22.23 FEET          MANNING'S N     0.01300
  SF=(Q/K)**2    ((      6.25)/(   105.018))**2 = 0.00354
```

```
 HF=L*SF = (     22.23}*(0.00354} =      0.079

 NODE   1039.00 : HGL = <  532.989>;EGL=  <  533.183>;FLOWLINE=  <  528.320>

****************************************************************************
 FLOW PROCESS FROM NODE  1039.00 TO NODE  1039.00 IS CODE =  8
 UPSTREAM NODE  1039.00     ELEVATION =   528.32   (FLOW IS UNDER PRESSURE)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       6.25 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY  =  3.54  FEET/SEC.   VELOCITY  HEAD  =  0.194  FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.194) =  0.039

 NODE   1039.00 : HGL = <  533.222>;EGL= <  533.222>;FLOWLINE= <  528.320>

**********************************  ************************************  ***
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  1039.00            FLOWLINE ELEVATION =   528.32
 ASSUMED UPSTREAM CONTROL HGL =    529.29 FOR DOWNSTREAM RUN ANALYSIS

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 END OF GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared by:

RICK ENGINEERING COMPANY
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San Diego, California 92110
619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1025 TO 1044 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *
****

FILE NAME: A:/lOOOM.PIP
TIME/DATE OF STUDY: 15:29 09/28/2004

****

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
1025.00-	} FRICTION	5.32*	1025.98	1.32	335.03
1035.00-	} JUNCTION	5.04*	971.28	1.49 De	328.48
1035.00-	) FRICTION	5.03*	580.49	0.94	193.31
1042.00-	) JUNCTION	3.64*	427.22	1.21 De	177.59
1042.00-	} FRICTION	4.33*	502.90	1.16	178.10
1043.00-	} JUNCTION	4.22*	491.04	1.21 De	177.59
1043.00-	} FRICTION	4.72*	468.23	0.54	103.72
1044.00-	} CATCH BASIN	3.94*	382.27	0.89 De	76.20
1044.00-		4.10*	369.90	0.89 De	26.03

MAXIMut1 NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

****

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER 1025.00 FLOWLINE ELEVATION = 526.70
PIPE FLOW = 17.04 CFS PIPE DIAMETER = 24.00 INCHES

```
 ASSUMED DOWNSTREAM CONTROL HGL =   532.020 FEET

 NODE   1025.00 : HGL = <  532.020>;EGL= <  532.477>;FLOWLINE= <  526.700>

**************************************************************************    ********
 FLOW PROCESS FROM NODE  1025.00 TO NODE  1035.00 IS CODE =  1
 UPSTREAM NODE  1035.00     ELEVATION =   527.38  (FLOW IS UNDER PRESSURE)

 CALCULATE FRICTION LOSSES(LACFCD}:
 PIPE FLOW          17.04 CFS     PIPE DIAMETER =  24.00 INCHES
 PIPE LENGTH        70.67 FEET          MANNING'S N     0.01300
 SF=(Q/K)**2    ((     17.04)/(   226.229))**2 = 0.00567
 HF=L*SF = (     70.67)*(0.00567) =      0.401

 NODE  1035.00 : HGL = <  532.42l>;EGL= <  532.878>;FLOWLINE= <  527.380>

*************************************************************************
 FLOW PROCESS FROM NODE  1035.00 TO NODE  1035.00 IS CODE =  5
 UPSTREAM NODE  1035.00     ELEVATION =   527.88  (FLOW IS UNDER PRESSURE)

 CALCULATE JUNCTION LOSSES:
      PIPE       FLOW    DIAMETER    ANGLE     FLOWLINE   CRITICAL   VELOCITY
                 (CFS)   (INCHES}  (DEGREES} ELEVATION  DEPTH{FT.}   (FT/SEC}
   UPSTREAM       9.93    18.00       0.00    527.88       1.21        5.619
  DOWNSTREAM     17.04    24.00               527.38       1.49        5.424
  LATERAL #1      1.62    18.00      90.00    527.88       0.48        0.917
  LATERAL #2      5.49    18.00      90.00    527.88       0.90        3.107
     QS           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Ql*Vl*COS{DELTA1)-Q3*V3*COS{DELTA3}-
    Q4*V4*COS(DELTA4))/((Al+A2)*16.l}+FRICTION LOSSES
 UPSTREAM:.    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00894
 DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00567
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00730
 JUNCTION LENGTH     4.00 FEET
 FRICTION LOSSES    0.029 FEET         ENTRANCE LOSSES    0.000  FEET
 JUNCTION LOSSES    (DY+HV1-HV2}+(ENTRANCE LOSSES)
 JUNCTION LOSSES    ( 0.526)+( 0.000) =    0.526

 NODE   1035.00 : HGL = <  532.914>;EGL= <  533.404>;FLOWLINE= <  527.880>

********************    ******************************************************
 FLOW PROCESS. FROM NODE  1035.00 TO NODE  1042.00 IS CODE =  1
 UPSTREAM NODE  1042.00     ELEVATION =   530.67  (FLOW IS UNDER PRESSURE)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW           9.93 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH       156.67 FEET          MANNING'S N0.01300
 SF=(Q/K)**2    {(     9.93)/(   105.042))**2 = 0.00894
 HF=LSF = (    156.67)*(0.00894) =      1.400

 NODE  1042.00 : HGL = <  534.314>;EGL= <  534.804>;FLOWLINE= <  530.670>

*************************************************"********************   ********
 FLOW PROCESS FROM NODE  1042.00 TO NODE  1042.00 IS CODE =  5
 UPSTREAM NODE  1042.00     ELEVATION =   531.00  (FLOW IS UNDER PRESSURE)
```

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 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW    DIAMETER    ANGLE     FLOWLINE   CRITICAL    VELOCITY
                  (CFS)   (INCHES}  (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM       9.93     18.00      90.00     531.00       1.21        5.619
   DOWNSTREAM      9.93     18.00                530.67       1.21        5.619
   LATERAL #1      0.00      0.00       0.00       0.00       0.00        0.000
   LATERAL #2      0.00      0.00       0.00       0.00       0.00        0.000
      Q5           0.00===QS EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3}-
     Q4*V4*COS(DELTA4) )/( (Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00894
DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00894
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00894
 JUNCTION LENGTH     4.00 FEET
 FRICTION LOSSES    0.036 FEET         ENTRANCE LOSSES    0.000 FEET
 JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES    ( 1.016}+( 0.000) =    1.016

 NODE   1042.00 : HGL = <  535.330>;EGL= <  535.820>;FLOWLINE= <  531.000>

**********************************************************************     **********
 FLOW PROCESS FROM NODE  1042.00 TO NODE  1043.00 IS CODE =  1
 UPSTREAM NODE  1043.00     ELEVATION =   531.98   (FLOW IS UNDER PRESSURE)

. CALCULATE FRICTION LOSSES(LACFCD) :
 PIPE FLOW           9.93 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH        97.62 FEET          MANNING'S N0.01300
 SF=(Q/K)**2    ((      9.93)/(   105.043))**2 = 0.00894
 HF=L*SF = (     97.62)*(0.00894) =      0.872

 NODE  1043.00 : HGL = <  536.202>;EGL= <  536.693>;FLOWLINE= <  531.980>

 ***************************************************************************
 FLOW PROCESS FROM NODE  1043.00 TO NODE  1043.00 IS CODE =  5
 UPSTREAM NODE  1043.00     ELEVATION =   532.31   (FLOW IS UNDER PRESSURE)

 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW    DIAMETER    ANGLE     FLOWLINE   CRITICAL    VELOCITY
                  (CFS)   (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM       5.31     18.00      51.00     532.31       0.89        3.005
   DOWNSTREAM      9.93     18.00                531.98       1.21        5.620
   LATERAL #1      4.62     18.00      89.00     532.31       0.83        2.614
   LATERAL #2      0.00      0.00       0.00       0.00       0.00        0.000
      QS           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/( (Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00256
DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00894
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00575
 JUNCTION LENGTH     4:00 FEET
 FRICTION LOSSES    0.023 FEET         ENTRANCE LOSSES    0.000 FEET
 JUNCTION LOSSES    (DY+HV1-HV2)+{ENTRANCE LOSSES)
```

```
 JUNCTION LOSSES =  ( 0.473)+(  0.000) =    0.473

 NODE   1043.00 : HGL = <  537.026>;EGL=  <  537.166>;FLOWLINE=  <  532.310>

 ****************************************************************************
 FLOW PROCESS FROM NODE  1043.00 TO NODE  1044.00 IS CODE =  1
 UPSTREAM NODE  1044.00     ELEVATION =   533.11  (FLOW IS UNDER PRESSURE)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW           5.31 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE  LENGTH        7.97 FEET          MANNING'S N     0.01300
 SF=(Q/K)**2   (( 5.31)/(        105.151))**2 = 0.00255
 HF=L*SF =  (      7.97)*(0.00255) =      0.020
---------------------------------------------------- ----------------------
 NODE   1044.00 : HGL = <  537.046>;EGL= <  537.186>;FLOWLINE= <  533.110>

 ****************************************************************************
 FLOW PROCESS FROM NODE  1044.00 TO NODE  1044.00 IS CODE =  8
 UPSTREAM NODE  1044.00     ELEVATION =   533.11  (FLOW IS UNDER PRESSURE)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       5.31 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =  3.01 FEET/SEC.  VELOCITY H AD =  0.140 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.140) =  0.028

 NODE   1044.00 : HGL = <  537.214>;EGL= <  537.214>;FLOWLINE= <  533.110>

 ************************************   ************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  1044.00           FLOWLINE ELEVATION =   533.11
 ASSUMED UPSTREAM CONTROL HGL =    534.00 FOR DOWNSTREAM RUN ANALYSIS

== ==========  ============================ == ====================
 END OF GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 1000 (NODE 1043 TO 1047 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *
****

FILE NAME: A:/lOOON.PIP
TIME/DATE OF STUDY: 16:25 09/28/2004

****

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
1043.00-		4.72*	461.49	0.61	72.40
	} FRICTION				
1047.00-		4.31*	416.67	0.83 De	64.02
	} CATCH BASIN				
1047.00-		4.44*	407.19	0.83 De	22.14

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

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

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 1043.00 FLOWLINE ELEVATION = 532.31
PIPE FLOW = 4.65 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 537.030 FEET

NODE 1043.00 : **HGL** = < 537.030>;EGL= < 537.138>;FLOWLINE= < 532.310>

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

FLOW PROCESS FROM NODE 1043.00 TO NODE 1047.00 IS CODE = 1
UPSTREAM NODE 1047.00 ELEVATION = 532.76 (FLOW IS UNDER PRESSURE)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 4.65 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH 22.25 FEET MANNING'S N 0.01300
SF=(Q/K)**2 ((4.65)/(105.070))**2 = 0.00196

```
  HF=L*SF = (     22.25)*{0.00196) =      0.044

  NODE  1047.00 : HGL = <  537.074>;EGL= <  537.lSl>;FLOWLINE= <  532.760>

********* ************************* ************************* ******************
  .FLOW PROCESS E'ROM NODE  1047.00 TO NODE  1047.00 IS CODE =  8
  UPSTREAM  NODE  1047.00      ELEVATION =   532.76   (FLOW IS UNDER PRESSURE)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       4.65 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  2.63 FEET/SEC.   VELOCITY HEAD =  0.107 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD)= .2*{  0.107) =   0.021

  NODE  1047.00 : HGL = <  537.203>;EGL= <  537.203>;FLOWLINE= <  532.760>

********************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1047.00            FLOWLINE ELEVATION =   532.76
  ASSUMED UPSTREAM CONTROL HGL =    533.59 FOR DOWNSTREAM RUN ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
```

SYSTEM 2000

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

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DESCRIPTION OF STUDY

McMILLIN OTAY RANCH VILLAGE 7 **J-14531A**
PRESSURE PIPE FLOW ANALSIS AT BASIN 2000 (MAIN)
50-YR STORM EVENT, ULTIMATE CONDITION **BY: PT**

FILE NAME: A:/2000.PIP
TIME/DATE OF STUDY: 10:35 09/28/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS}	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
2040.00-	) FRICTION	2.50	1031.06	1.18*	1465.22
2033.00-	) JUNCTION	2.14*Dc	987.81	2.14*Dc	987.81
2033.00-	) FRICTION	3.10*	861.25	1.10	753.90
2107.00-	) HYDRAULIC JUMP	1.78 De	570.04	1.21*	688.87
2107.00-	) JUNCTION	1.85	500.67	1.03*	666.00
2030.00-	) FRICTION	1.69 De	494.07	1.09*	626.04
2030.00-	) JUNCTION	1.66 De	454.10	1.08*	566.12
2019.00-	) FRICTION	l.66*Dc	454.10	l.66*Dc	454.10
2019.00-	} JUNCTION	2.44*	370.65	0.91	234.14
2101.00-	) FRICTION	2.04*	292.19	0.93	229.49
2101.00-	} JUNCTION	1.62	201.29	0.83*	207.63
2015.00-	) FRICTION	l.2l*Dc	174.09	l.2l*Dc	174.09
2015.00-	) JUNCTION	1.44	146.24	0.78*	150.03
2008.00-	) FRICTION	1.09*Dc	130.21	l.09*Dc	130.21

```
          JUNCTION
2008.00-              1.60*            101.56        0.50              31.77
       } FRICTION         } HYDRAULIC JUMP
2004.00-              0.61 De           30.01        0.39*             38.88
       |JUNCTION
2004.00-              0.61 De           30.01        0.44*             34.83
       } FRICTION
2005.00-              0.6l*Dc           30.01        0.6l*Dc           30.01
       } CATCH BASIN
2005.00-              0.88*             16.06        0.61 De           10.74

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**********************************************************************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  2040.00           FLOWLINE ELEVATION =   523.00
 PIPE FLOW =      40.52 CFS       PIPE DIAMETER =  30.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   525.500 FEET

 NODE  2040.00 : HGL = <  524.18l>;EGL= <  529.076>;FLOWLINE= <  523.000>

*****************************************************   ********* **********
 FLOW PROCESS FROM NODE  2040.00 TO NODE  2033.00 IS CODE =  1
 UPSTREAM NODE  2033.00     ELEVATION =   530.79   (FLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          40.52 CFS     PIPE DIAMETER =  30.00 INCHES
 PIPE LENGTH =     145.65 FEET          MANNING'S N     0.01300

 NORMAL DEPTH(FT) =      1.14           CRITICAL DEPTH(FT) =      2.14

 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     2.14

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH   VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)          (FT)     (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
        0.000          2.136       9.069          3.414           987.81
        0.051          2.096       9.217          3.416           988.44
        0.193          2.056       9.377          3.422           990.13
        0.432          2.017       9.547          3.433           992.92
        0.780          1.977       9.730          3.448           996.85
        1.246          1.937       9.926          3.468          1001.98
        1.844          1.897      10.135          3.493          1008.36
        2.591          1.857      10.358          3.524          1016.05
        3.506          1.818      10.596          3.562          1025.14
        4.612          1.778      10.849          3.607          1035.69
        5.937          1.738      11.120          3.659          1047.79
        7.515          1.698      11.409          3.721          1061.55
        9.390          1.658      11.717          3.792          1077.07
       11.614          1.619      12.047          3.874          1094.49
       14.255          1.579      12.399          3.968          1113.92
       17.402          1.539      12.776          4.075          1135.54
       21.171          1.499      13.180          4.198          1159.50
```

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        25.720          1.460     13.613          4.339          1186.01
        31.274          1.420     14.078          4.499          1215.28
        38.160          1.380     14.578          4.682          1247.56
        46.891          1.340     15.117          4.891          1283.12
        58.323          1.300     15.699          5.130          1322.30
        74.068          1.261     16.329          5.403          1365.44
        97.751          1.221     17.011          5.717          1412.98
       141.001          1.181     17.751          6.077          1465.39
       145.650          1.181     17.749          6.076          1465.22
-----------------------------------    ----------------------------------------
  NODE   2033.00 : HGL = <  532.926>;EGL= <  534.204>;FLOWLINE= <  530.790>

**************************  ********************** ********* * * ************ *   ***
  FLOW PROCESS FROM NODE  2033.00 TO NODE  2033.00 IS CODE =  5
  UPSTREAM NODE  2033.00     ELEVATION =   531.13  (FLOW IS AT CRITICAL DEPTH)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW    DIAMETER   ANGLE     FLOWLINE   CRITICAL   VELOCITY
                   (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
     UPSTREAM      27.29     30.00      0.00     531.13      1.78        5.559
    DOWNSTREAM     40.52     30.00               530.79      2.14        9.058
    LATERAL #1      6.99     18.00     50.00     532.13      1.02        3.995
    LATERAL #2      6.24     18.00     77.00     532.13      0.97        3.567
       QS           0.00===QS EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY= (Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00443
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00910
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00676
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.027 FEET         ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES   ( 0.508)+( 0.000) =   0.508

  NODE  2033.00 : HGL = <  534.232>;EGL= <  534.712>;FLOWLINE= <  531.130>

 ****************************************************************************
  FLOW PROCESS FROM NODE  2033.00 TO NODE  2107.00 IS CODE =  1
  UPSTREAM NODE  2107.00     ELEVATION =   533.80  (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          27.29 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =      89.04 FEET          MANNING'S N     0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT) =       1.08           CRITICAL DEPTH(FT) =     1.78
==================;==========    ==========================================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =      1.21

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH   VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          1.209      11.603          3.300           688.87
```

1.867	1.203	11.669	3.319	691.59
3.837	1.198	11.736	3.338	694.36
5.918	1.193	11.804	3.358	697.17
8.120	1.187	11.872	3.377	700.03
10.457	1.182	11.942	3.398	702.94
12.941	1.177	12.012	3.419	705.89
15.590	1.171	12.083	3.440	708.89
18.421	1.166	12.155	3.461	711.94
21.457	1.161	12.227	3.484	715.03
24.725	1.155	12.301	3.506	718.18
28.258	1.150	12.375	3.529	721.38
32.094	1.145	12.451	3.553	724.62
36.282	1.139	12.527	3.577	727.92
40.884	1.134	12.604	3.602	731.27
45.979	1.129	12.682	3.627	734.68
51.672	1.123	12.761	3.653	738.14
58.104	1.118	12.840	3.680	741.65
65.474	1.113	12.921	3.707	745.22
74.071	1.107	13.003	3.734	748.84
84.346	1.102	13.086	3.762	752.53
89.040	1.100	13.117	3.773	753.90

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 3.10

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	3.102	5.559	3.582	861.25
23.547	2.500	5.559	2.980	676.89

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 2.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
23.547	2.500	5.558	2.980	676.89
24.587	2.471	5.569	2.953	668.71
25.552	2.442	5.591	2.928	661.06
26.470	2.414	5.618	2.904	653.78
27.351	2.385	5.651	2.881	646.83
28.197	2.356	5.689	2.859	640.18
29.013	2.327	5.730	2.838	633.82
29.799	2.299	5.776	2.817	627.73
30.557	2.270	5.826	2.797	621.93
31.285	2.241	5.880	2.778	616.40
31.984	2.212	5.937	2.760	611.15
32.654	2.184	5.998	2.743	606.18
33.294	2.155	6.063	2.726	601.50
33.902	2.126	6.132	2.710	597.10
34.478	2.097	6.205	2.696	593.01
35.019	2.069	6.281	2.682	589.22
35.524	2.040	6.362	2.669	585.73
35.991	2.011	6.447	2.657	582.57

```
        36.417          1.982       6.536          2.646          579.74
        36.800          1.954       6.629          2.636          577.25
        37.136          1.925       6.727          2.628          575.10
        37.421          1.896       6.830          2.621          573.32
        37.652          1.867       6.938          2.615          571.91
        37.824          1.839       7.051          2.611          570.88
        37.932          1.810       7.169          2.608          570.25
        37.969          1.781       7.293          2.607          570.04
        89.040          1.781       7.293          2.607          570.04
------------------------END OF HYDRAULIC JUMP ANALYSIS-------------------------
 PRESSURE+MOMENTUM BALANCE OCCURS AT    J.4.33 FEET UPSTREAM OF NODE 2033.00
|       DOWNSTREAM DEPTH = 2.736 FEET, UPSTREAM CONJUGATE DEPTH = 1.107 FEET |

  NODE   2107.00 : HGL = <  535.009>;EGL= <  537.lOO>;FLOWLINE= <  533.800>

*    ***************************************************************     * *******
  FLOW PROCESS FROM NODE  2107.00 TO NODE  2107.00 IS CODE =  5
  UPSTREAM NODE  2107.00     ELEVATION =   534.13  (FLOW IS SUPERCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL   VELOCITY
                   (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)   (FT/SEC)
     UPSTREAM       24.54     30.00       0.00     534.13       1.69       12.936
    DOWNSTREAM      27.29     30.00                533.80       1.78       11.606
    LATERAL #1       2.75     18.00      90.00     534.80       0.63        3.911
    LATERAL #2       0.00      0.00       0.00       0.00       0.00        0.000
       Q5            0.00===QS EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS( DELTA4) )/( (Al+A2)*16.l)+FRICTION  LOSSES
  UPSTREAM:     MANNING'S  N = 0.01300;  FRICTION  SLOPE = 0.02872
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION  SLOPE = 0.01986
  AVERAGED  FRICTION  SLOPE IN JUNCTION ASSUMED AS 0.02429
  JUNCTION LENGTH      4.00 fEET
  FRICTION LOSSES     0.097 FEET          ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 0.654 )+( 0.000) =    0.654

  NODE   2107.00 : HGL = <  535.156>;EGL= <  537.754>;FLOWLINE= <  534.130>

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  FLOW PROCESS FROM NODE  2107.00 TO NODE  2030.00 IS CODE =  1
  UPSTREAM NODE  2030.00     ELEVATION =   540.13  (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          24.54 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =     206.96 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      1.02          CRITICAL DEPTH( FT) =     1.69
===============================================================================
  UPSTREAM CONTROL ASSUMED  FLOWDEPTH(FT) =      1.09
=;=====================-=  ====;=========================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE  FROM      FLOW  DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL( FT)            (FT)    (FT/SEC)     ENERGY( FT)    MOMENTUM(POUNDS)
```

0.000	1.091	11.923	3.300	626.04
2.005	1.088	11.962	3.311	627.55
4.108	1.085	12.001	3.323	629.07
6.317	1.083	12.041	3.335	630.60
8.642	1.080	12.081	3.348	632.15
11.095	1.077	12.121	3.360	633.71
13.688	1.075	12.161	3.372	635.28
16.437	1.072	12.201	3.385	636.87
19.360	1.069	12.242	3.398	638.47
22.478	1.066	12.283	3.411	640.08
25.816	1.064	12.324	3.424	641.71
29.405	1.061	12.366	3.437	643.35
33.281	1.058	12.408	3.450	645.01
37.492	1.056	12.450	3.464	646.67
42.095	1.053	12.492	3.478	648.36
47.165	1.050	12.535	3.492	650.05
52.801	1.048	12.578	3.506	651.77
59.137	1.045	12.621	3.520	653.49
66.359	1.042	12.664	3.534	655.23
74.744	1.039	12.708	3.549	656.99
84.715	1.037	12.752	3.563	658.76
96.987	1.034	12.797	3.578	660.54
112.896	1.031	12.841	3.593	662.34
135.446	1.029	12.886	3.609	664.15
174.277	1.026	12.931	3.624	665.98
206.960	1.026	12.932	3.624	666.00

NODE 2030.00 : **HGL** = < 541.221>;EGL= < 543.430>;FLOWLINE= < 540.130>

****

FLOW PROCESS FROM NODE 2030.00 TO NODE 2030.00 IS CODE = 5
UPSTREAM NODE 2030.00 ELEVATION = 540.63 (FLOW IS SUPERCRITICAL)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (Œ"'S)	DIAMETER (INCHES)	ANGLE (DEGREES)	E"'LOWLINE ELEVATION	CRITICAL DEPTH (FT.)	VELOCITY (FT/SEC)
UPSTREAM	21.51	24.00	0.00	540.63	1.66	12.376
DOWNSTREAM	24.54	30.00		540.13	1.69	11.927
LATERAL #1	3.03	18.00	56.00	541.46	0.66	4.031
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Ql*Vl*COS(DELTA1) -Q3*V3*COS(DELTA3) -
Q4*V4*COS(DELTA4))/({Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.02766
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.02302
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.02534
JUNCTION LENGTH 4.00 FEET
FRICTION LOSSES 0.101 FEET ENTRANCE LOSSES 0.000 FEET
JUNCTION LOSSES (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES { 0.662)+{ 0.000) = 0.662

NODE 2030.00 : **HGL** = < 541.714>;EGL= < 544.092>;FLOWLINE= < 540.630>

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

FLOW PROCESS FROM NODE 2030.00 TO NODE 2019.00 IS CODE = 1

UPSTREAM NODE 2019.00 ELEVATION = 548.40 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 21.51 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 262.51 FEET MANNING'S N0.01300

NORMAL DEPTH(FT) = 1.06 CRITICAL DEPTH(FT) = 1.66
========== =;==========

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.66

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.659	7.719	2.585	454.10
0.039	1.635	7.821	2.585	454.24
0.161	1.611	7.929	2.588	454.66
0.373	1.587	8.043	2.592	455.38
0.683	1.563	8.162	2.598	456.40
1.101	1.539	8.287	2.607	457.73
1.639	1.516	8.419	2.617	459.38
2.309	1.492	8.557	2.629	461.37
3.128	1.468	8.702	2.644	463.71
4.116	1.444	8.855	2.662	466.41
5.294	1.420	9.015	2.683	469.49
6.691	1.396	9.183	2.706	472.97
8.342	1.372	9.359	2.733	476.87
10.289	1.348	9.544	2.764	481.19
12.586	1.324	9.739	2.798	485.98
15.304	1.301	9.943	2.837	491.24
18.534	1.277	10.158	2.880	497.01
22.404	1.253	10.384	2.928	503.31
27.088	1.229	10.622	2.982	510.18
32.845	1.205	10.872	3.042	517.64
40.078	1.181	11.136	3.108	525.73
49.458	1.157	11.415	3.182	534.50
62.248	1.133	11.708	3.263	543.97
81.286	1.109	12.019	3.354	554.21
115.679	1.086	12.347	3.454	565.26
262.510	1.084	12.372	3.462	566.12

NODE 2019.00 : **HGL** = < 550.059>;EGL= < 550.985>;FLOWLINE= < 548.400>

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

FLOW PROCESS FROM NODE 2019.00 TO NODE 2019.00 IS CODE = 5
UPSTREAM NODE 2019.00 ELEVATION = 548.90 (FLOW IS AT CRITICAL DEPTH)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER {INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	12.00	24.00	0.00	548.90	1.24	3.820
DOWNSTREAM	21.51	24.00		548.40	1.66	7.721
LATERAL #1	5.05	18.00	89.00	549.40	0.86	3.107
LATERAL #2	4.46	18.00	89.00	549.40	0.81	2.744
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:

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 DY=(Q2*V2-Ql*Vl*COS(  DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
 UPSTREAM:     MANNING'S N = 0.01300;  fRICTION SLOPE = 0.00281
 DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00885
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00583
 JUNCTION LENGTH      4.00 FEET
 FRICTION LOSSES     0.023 FEET          ENTRANCE  LOSSES     0.000 FEET
 JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE  LOSSES)
 JUNCTION LOSSES    ( 0.580)+( 0.000) =    0.580

 NODE   2019.00 : HGL = <  551.338>;EGL= <  551.564>;FLOWLINE= <  548.900>

****************** ************** ************ ************************** ***
 FLOW  PROCESS  FROM NODE   2019.00 TO NODE   2101.00  IS CODE =   1
 UPSTREAM NODE   2101.00      ELEVATION =    549.38   (FLOW rS  UNDER  PRESSURE)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW           12.00 CFS      PIPE DIAMETER =  24.00 INCHES
 PIPE  LENGTH        28.35  FEET           MANNING'S N      0.01300
 SF=(Q/K)**2    ((     12.00)/(    226.219))**2  =  0.00281
 HF=L*SF =  (     28.35)*(0.00281) =       0.080

 NODE   2101.00 : HGL = <  551.417>;EGL= <  551.644>;FLOWLINE= <  549.380>

*************** ************ **** ***********************************  ** * * *   *
 FLOW  PROCESS  FROM NODE   2101.00 TO NODE   2101.00  IS CODE =   5
 UPSTREAM NODE   2101.00      ELEVATION =    549.71   (FLOW IS UNDER  PRESSURE)
 (NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)

 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE   CRITICAL   VELOCITY
                  (CFS)    (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM        9.79     18.00       0.00     549.71       1.21        9.775
   DOWNSTREAM      12.00     24.00                549.38       1.24        3.820
   LATERAL  #1      2.21     18.00      87.00     550.21       0.56        2.427
   LATERAL  #2      0.00      0.00       0.00       0.00       0.00        0.000
      Q5            0.00===Q5  EQUALS  BASIN  INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V  3*COS(DELTA3}-
     Q4 *V4*COS(DELTA4)) / ((Al+A2)*16.l)+FRICTION  LOSSES
 UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02495
 DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00281
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01388
 JUNCTION LENGTH      4.00 FEET
 FRICTION LOSSES     0.056 FEET          ENTRANCE LOSSES     0.000 FEET
 JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES    ( 0.378)+( 0.000) =    0.378

 NODE   2101.00 : HGL = <  550.539>;EGL= <  552.022>;FLOWLINE= <  549.710>

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 FLOW  PROCESS  FROM NODE   2101.00 TO NODE   2015.00  IS CODE =   1
 UPSTREAM NODE   2015.00      ELEVATION =    556.64   (FLOW rs SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE  FLOW            9.79 CFS      PIPE DIAMETER =  18.00  INCHES
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PIPE LENGTH = 263.55 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.82 CRITICAL DEPTH(FT) = 1.21

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.21

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL (FT)	FLOW DEPTH (FT)	VELOCITY {FT/SEC}	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTt.J M{POt.JNDS)
0.000	1.207	6.422	1.848	174.09
0.026	1.191	6.502	1.848	174.13
0.109	1.176	6.586	1.850	174.26
0.252	1.160	6.674	i.852	174.48
0.462	1.144	6.765	1.856	174.79
0.744	1.129	6.861	1.860	175.20
1.108	1.113	6.960	1.866	175.71
1.562	1.097	7.064	1.873	176.31
2.117	1.082	7.173	1.881	177.03
2.786	1.066	7.286	1.891	177.85
3.583	1.050	7.404	1.902	178.79
4.528	1.035	7.527	1.915	179.85
5.644	1.019	7.656	1.930	181.03
6.959	1.003	7.790	1.946	182.34
8.510	0.988	7.930	1.965	183.78
10.341	0.972	8.076	1.986	185.36
12.516	0.956	8.229	2.009	187.09
15.117	0.941	8.389	2.034	188.97
18.261	0.925	8.556	2.063	191.01
22.119	0.909	8.731	2.094	193.22
26.957	0.894	8.914	2.128	195.61
33.220	0.878	9.106	2.166	198.19
41.744	0.862	9.307	2.208	200.96
54.404	0.847	9.517	2.254	203.94
77.225	0.831	9.738	2.305	207.14
263.550	0.829	9.772	2.312	207.63

NODE 2015.00 : **HGL** = < 557.847>;EGL= < 558.488>;FLOWLINE= < 556.640>

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

FLOW PROCESS FROM NODE 2015.00 TO NODE 2015.00 IS CODE = 5
UPSTREAM NODE 2015.00 ELEVATION = 556.97 (FLOW IS AT CRITICAL DEPTH)
(NOTE: POSSIBLE JOMP IN OR UPSTREAM OF STRUCTURE)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	7.93	18.00	0.00	556.97	1.09	8.499
DOWNSTREAM	9.79	18.00		556.64	1.21	6.424
LATERAL #1	1.86	18.00	90.00	557.47	0.51	3.478
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	0.00	===Q5 EQUALS BASIN INPUT===				

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY= (Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((Al+A2)*16.l}+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.01972

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 DOWNSTREAM:   MANNING'S  N  =  0.01300;  FRICTION  SLOPE  =  0.00899
 AVERAGED  FRICTION  SLOPE  IN  JUNCTION  ASSUMED  AS  0.01436
 JUNCTION  LENGTH      4.00  FEET
 FRICTION  LOSSES     0.057  FEET          ENTRANCE  LOSSES     0.000 fEET
 JUNCTION  LOSSES    (DY+HV1-HV2)+( ENTRANCE  LOSSES)
 JUNCTION  LOSSES    ( 0.387)+(  0.000) =    0.387

 NODE   2015.00 : HGL = <   557.753>;EGL= <   558.875>;FLOWLINE= <   556.970>

********* *** ************************** *** ** * **** * ***************** *** *******
 FLOW PROCESS FROM NODE   2015.00 TO NODE   2008.00 IS CODE =   1
 UPSTREAM NODE   2008.00      ELEVATION =    562.58   (FLOW IS  SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE  FLOW            7.93 CFS      PIPE DIAMETER =   18.00 INCHES
 PIPE  LENGTH =      272.00  FEET           MANNING'S  N      0.01300

 NORMAL  DEPTH(FT)  =       0.77            CRITICAL  DEPTH( FT) =       1.09

 UPSTREAM  CONTROL  ASSUMED  FLOWDEPTH(FT)  =      1.09

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE  FROM       FLOW DEPTH   VELOCITY       SPECIFIC         PRESSURE+
  CONTROL( FT)            {FT)     {FT/SEC)     ENERGY( FT)     MOMENTUM(POUNDS)
         0.000           1.091       5.758           1.606            130.21
         0.023           1.078       5.831           1.606            130.23
         0.095           1.065       5.906           1.607            130.31
         0.221           1.053       5.983           1.609            130.44
         0.406           1.040       6.063           1.611            130.63
         0.656           1.027       6.147           1.614            130.88
         0.979           1.014       6.233           1.618            131.18
         1.382           1.002       6.322           1.623            131.55
         1.875           0.989       6.414           1.628            131.98
         2.469           0.976       6.510           1.635            132.47
         3.180           0.964       6.609           1.642            133.04
         4.022           0.951       6.712           1.651            133.67
         5.018           0.938       6.818           1.660            134.38
         6.191           0.925       6.928           1.671            135.16
         7.574           0.913       7.043           1.683            136.02
         9.210           0.900       7.162           1.697            136.96
        11.151           0.887       7.285           1.712            137.98
        13.472           0.874       7.413           1.728            139.09
        16.276           0.862       7.546           1.747            140.30
        19.717           0.849       7.685           1.767            141.60
        24.028           0.836       7.828           1.788            142.99
        29.605           0.824       7.978           1.812            144.50
        37.188           0.811       8.134           1.839            146.11
        48.441           0.798       8.296           1.867            147.83
        68.703           0.785       8.465           1.899            149.68
       272.000           0.783       8.496           1.905            150.03
-------------------------------------------------------------------------------
 NODE   2008.00 : HGL = <   563.671>;EGL= <   564.186>;FLOWLINE= <   562.580>

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 FLOW PROCESS FROM NODE   2008.00 TO NODE   2008.00 IS COD =   5
 UPSTREAM NODE   2008.00      ELEVATION =    562.91   (FLOW IS AT CRITICAL DEPTH)
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CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(F'T.)	VELOCITY (FT/SEC)
UPSTREAM	2.59	18.00	0.00	562.91	0.61	1.465
DOWNSTREAM	7.93	18.00		562.58	1.09	5.760
LATERAL #1	3.29	18.00	90.00	562.91	0.69	2.201
LATERAL #2	2.05	18.00	90.00	562.91	0.54	1.37?:.
Q5	O.OO===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA E'LOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00061
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00738
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00399
JUNCTION LENGTH 4.00 FEET
FRICTION LOSSES 0.016 FEET ENTRANCE LOSSES 0.000 FEET
JUNCTION LOSSES (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES (0.362)+(0.000) = 0.362

NODE 2008.00 : **HGL** = < 564.514>;EGL= < 564.548>;FLOWLINE= < 562.910>

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FLOW PROCESS FROM NODE 2008.00 TO NODE 2004.00 IS CODE = 1
UPSTREAM NODE 2004.00 ELEVATION = 565.60 (HYDRAULIC JUMP OCCURS)

CALCULATE E'RICTION LOSSES(LACFCD):
PIPE FLOW 2.59 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 265.26 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.51 CRITICAL DEPTH(FT) = 0.61

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.39

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM{ POUNDS)
0.000	0.394	7.001	1.155	38.88
1.207	0.398	6.891	1.136	38.43
2.437	0.403	6.783	1.117	38.00
3.693	0.407	6.679	1.100	37.58
4.977	0.412	6.577	1.084	37.18
6.291	0.416	6.479	1.068	36.79
7.640	0.420	6.382	1.053	36.42
9.026	0.425	6.289	1.039	36.07
10.455	0.429	6.197	1.026	35.73
11.930	0.434	6.108	1.014	35.40
13.460	0.438	6.022	1.002	35.08
15.050	0.443	5.937	0.991	34.78
16.711	0.447	5.855	0.980	34.49
18.453	0.452	5.774	0.970	34.21
20.291	0.456	5.696	0.960	33.94
22.244	0.461	5.619	0.951	33.68

24.335	0.465	5.545	0.943	33.44
26.598	0.470	5.472	0.935	33.20
29.080	0.474	5.401	0.927	32.98
31.846	0.479	5.331	0.920	32.76
35.004	0.483	5.263	0.914	32.56
38.728	0.488	5.197	0.907	32.36
43.349	0.492	5.132	0.901	32.18
49.607	0.497	5.068	0.896	32.00
59.879	0.501	5.006	0.891	31.83
265.260	0.503	4.981	0.888	31.77

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 1.60

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT}	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.604	1.466	1.638	101.56
10.945	1.500	1.466	1.533	90.06

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
10.945	1.500	1.465	1.533	90.06
14.621	1.464	1.474	1.498	86.19
18.247	1.429	1.491	1.463	82.39
21.843	1.393	1.513	1.429	78.67
25.417	1.358	1.539	1.394	75.03
28.970	1.322	1.570	1.360	71.49
32.504	1.286	1.605	1.326	68.04
36.019	1.251	1.645	1.293	64.69
39..515	1.215	1.688	1.259	61.46
42.991	1.180	1.737	1.226	58.34
46.444	1.144	1.791	1.194	55.35
49.872	1.108	1.850	1.161	52.49
53.272	1.073	1.915	1.130	49.75
56.639	1.037	1.986	1.098	47.16
59.969	1.002	2.065	1.068	44.72
63.252	0.966	2.152	1.038	42.43
66.481	0.930	2.249	1.009	40.30
69.643	0.895	2.355	0.981	38.33
72.721	0.859	2.474	0.954	36.54
75.693	0.823	2.606	0.929	34.94
78.528	0.788	2.753	0.906	33.53
81.180	0.752	2.919	0.885	32.33
83.585	0.717	3.106	0.867	31.36
85.634	0.681	3.318	0.852	30.63
87.149	0.645	3.560	0.842	30.17
87.785	0.610	3.838	0.839	30.01
265.260	0.610	3.838	0.839	30.01

----------END OF HYDRAULIC JUMP ANALYSIS----------

| PRESSURE+MOMENTUM BALANCE OCCURS AT 82.51 FEET UPSTREAM OF NODE 2008.00 |

```
       DOWNSTREAM DEPTH = 0.733 FEET, UPSTREAM CONJUGATE DEPTH = 0.502 FEET I

  NODE   2004.00 : HGL = <  565.994>;EGL= <  566.755>;FLOWLINE= <  565.600>

****************************************************************    ********
  FLOW PROCESS FROM NODE  2004.00 TO NODE  2004.00 IS CODE =  5
  UPSTREAM NODE  2004.00     ELEVATION =   565.93  (FLOW IS SUPERCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE       fLOW    DIAMETER   ANGLE    FLOWLINE   CRITICAL   VELOCITY
                  (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH (fT.)  (FT/SEC)
     UPSTREAM      2.59    18.00      0.00    565.93      0.61        5.955
    DOWNSTREAM     2.59    18.00              565.60      0.61        7.003
    LATERAL #1     0.00     0.00     89.00      0.00      0.00        0.000
    LATERAL #2     0.00     0.00      0.00      0.00      0.00        0.000
       Q5          O.OO===Q5 EQUALS BASIN INPUT===

  LACfCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(  DELTA3)-
      Q4 *V4*COS(DELTA4) )/((Al+A2)*16. l)+FRICTION  LOSSES
  UPSTREAM:     MANNING'S  N = 0.01300;  fRICTION  SLOPE =  0.01699
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION  SLOPE =  0.02676
  AVERAGED  fRICTION  SLOPE IN JUNCTION  ASSUMED  AS  0.02187
  JUNCTION  LENGTH      4 .00 FEET
  FRICTION LOSSES     0.087 FEET          ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE  LOSSES)
  JUNCTION LOSSES    ( 0.167)+(  0.000) =    0.167

  NODE   2004.00 : HGL = <  566.372>;EGL= <  566.923>;fLOWLINE= <  565.930>

*******************************  *********************************  ***********
  FLOW PROCESS  fROM NODE  2004.00 TO NODE  2005.00  IS CODE =  1
  UPSTREAM  NODE  2005.00     ELEVATION =   566.38  (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          2.59 CFS      PIPE DIAMETER =  18.00  INCHES
  PIPE LENGTH =      22.25 FEET          MANNING'S  N     0.01300

  NORMAL DEPTH(FT) =      0.42           CRITICAL DEPTH(FT) =      0.61

  UPSTREAM  CONTROL ASSUMED  FLOWDEPTH( FT) =     0.61

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------   ----
  DISTANCE FROM      FLOW  DEPTH  VELOCITY      SPECifIC        PRESSURE+
   CONTROL( FT)           (FT)    (FT/SEC}     ENERGY(FT}    MOMENTUM(POUNDS)
          0.000          0.610      3.838          0.839           30.01
          0.012          0.602      3.902          0.839           30.02
          0.049          0.595      3.968          0.839           30.04
          0.115          0.587      4.036          0.840           30.08
          0.211          0.580      4.106          0.842           30.13
          0.342          0.572      4.178          0.844           30.20
          0.510          0.565      4.253          0.846           30.29
          0.722          0.557      4.330          0.849           30.40
          0.980          0.550      4.410          0.852           30.52
          1.293          0.542      4.493          0.856           30.67
          1.667          0.535      4.578          0.861           30.83
```

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         2.112          0.527      4.667          0.866          31.01
         2.638          0.520      4.759          0.872          31.22
         3.258          0.513      4.854          0.879          31.44
         3.991          0.505      4.953          0.886          31.69
         4.858          0.498      5.055          0.895          31.97
         5.889          0.490      5.162          0.904          32.26
         7.122          0.483      5.272          0.914          32.59
         8.614          0.475      5.387          0.926          32.94
        10.445          0.468      5.507          0.939          33.31
        12.743          0.460      5.631          0.953          33.72
        15.717          0.453      5.760          0.968          34.16
        19.764          0.445      5.895          0.985          34.63
        22.250          0.442      5.953          0.993          34.83
 ------------------------------------------------------------------------
 NODE  2005.00 : HGL = <  566.990>;EGL= <  567.219>;FLOWLINE= <  566.380>

 ************************************************************************
 FLOW PROCESS FROM NODE  2005.00 TO NODE  2005.00 IS CODE =  8
 UPSTREAM NODE  2005.00     ELEVATION =   566.38  (FLOW IS AT CRITICAL DEPTH)

 CALCULATE CATCH BASIN ENTRANCE LOSSES{LACFCD):
 PIPE FLOW =       2.59 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY  =  3.84  FEET/SEC.   VELOCITY  HEAD  =  0.229 FEET
 CATCH BASIN ENERGY LOSS =  .2*{VELOCITY HEAD) = .2*(  0.229) =  0.046

 NODE  2005.00 : HGL = <  567.265>;EGL= <  567.265>;FLOWLINE= <  566.380>

************************************************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  2005.00          FLOWLINE ELEVATION     566.38
 ASSUMED UPSTREAM CONTROL HGL =    566.99 FOR DOWNSTREAM RUN ANALYSIS

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 END OF GRADUALLY VARIED FLOW ANALYSIS
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**************************************************************  ************ **
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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                            619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* McM LLIN OTAY RANCH VILLAGE 7                                  1 14531A  *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 2000 (NODE 2033 TO 2034 LATERAL)    *
* 50-YR STORM EVENT, ULTIMATE CONDITION                            BY:PT   *
 ******* ** ************ ********************** ******************************

  FILE NAME: A:/2000A.PIP
  TIME/DATE OF STUDY: 12:00 09/28/2004

**************************************************************  **************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                 (Note: "*" indicates nodal point data used.)
                      UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL   PRESSURE        PRESSURE+          FLOW          PRESSURE+
 NUMBER   PROCESS   HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOMENTUM(POUNDS)
 2033.00-              2.00*              213.37         0.70          155.32
        ) FRICTION
 2034.00-              1.50*              147.58         1.07 De       124.45
        ) CATCH BASIN
 2034.00-              1.85*              121.77         1.07 De        40.15

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
*********************  *****************  ***********************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  2033.00           FLOWLINE ELEVATION  =   532.13
 PIPE FLOW =       7.67 CFS       PIPE DIAMETER =  18.00  INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   534.230 FEET

 NODE  2033.00 : HGL = <  534.230>;EGL= <  534.523>;FLOWLINE  <  532.130>

****************************************************************************
 FLOW PROCESS FROM NODE  2033.00 TO NODE  2034.00 IS CODE =  1
 UPSTREAM NODE  2034.00     ELEVATION =   532.76  (FLOW IS UNDER PRESSURE)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW           7.67 CFS     PIPE DIAMETER =  18.00  INCHES
 PIPE LENGTH         6.25 FEET          MANNING'S N     0.01300
 SF=(Q/K)**2    ((      7.67)/(   105.039))**2 = 0.00533
```

```
 HF=L*SF = (      6.25)*(0.00533) =      0.033

 NODE   2034.00 : HGL  = <  534.263>;EGL= <  534.556>;FLOWLINE= <  532.760>

****************************************************************************
 FLOW PROCESS FROM NODE  2034.00 TO NODE  2034.00 IS CODE =  8
 UPSTREAM NODE  2034.00     ELEVATION =   532.76   (FLOW IS UNDER PRESSURE)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       7.67 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =   4.34 FEET/SEC.    VELOCITY HEAD =  0.292 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*( 0.292) =  0.058

 NODE   2034.00 : HGL   <  534.614>;EGL= <  534.614>;FLOWLINE= <  532.760>

****************************************************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  2034.00           FLOWLINE ELEVATION =   532.76
 ASSUMED UPSTREAM CONTROL HGL =    533.83 FOR DOWNSTREAM RUN ANALYSIS


 END Of GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 2000 (NODE 2033 TO 2037 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *

FILE NAME: A:/20008.PIP
TIME/DATE OF STUDY: 12:07 09/28/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
2033.00-		2.26*	217.96	0.53	169.90
)	FRICTION	} HYDRAULIC JUMP			
2037.00-		l.Ol*Dc	106.86	l.Ol*Dc	106.86
)	CATCH BASIN				
2037.00-		1.56*	88.79	1.01 De	35.25

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 2033.00 FLOWLINE ELEVATION = 532.13
PIPE FLOW = 6.85 CFS PIPE DIAMETER = 18.00 INCHES.
ASSUMED DOWNSTREAM CONTROL **HGL** = 534.390 FEET

NODE 2033.00 : **HGL** = < 534.390>;EGL= < 534.623>;FLOWLINE= < 532.130>

FLOW PROCESS FROM NODE 2033.00 TO NODE 2037.00 IS CODE = 1
UPSTREAM NODE 2037.00 ELEVATION = 534.36 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 6.85 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 22.87 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH{FT) = 0.47 CRITICAL DEPTH{FT) = 1.01

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.01

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENE:RGY (FT)	PRESSURE+ MOMENTUM(POUN DS)
0.000	1.013	5.393	1.465	106.86
0.011	0.991	5.528	1.466	106.94
0.044	0.969	5.671	1.469	107.17
0.103	0.947	5.823	1.474	107.56
0.191	0.925	5.985	1.482	108.12
0.311	0.903	6.158	1.493	108.87
0.468	0.881	6.342	1.506	109.82
0.668	0.860	6.538	1.524	110.97
0.917	0.838	6.748	1.545	112.35
1.222	0.816	6.973	1.571	113.97
1.592	0.794	7.214	1.602	115.84
2.040	0.772	7.472	1.639	118.00
2.579	0.750	7.750	1.683	120.46
3.227	0.728	8.049	1.735	123.25
4.007	0.706	8.372	1.795	126.40
4.947	0.684	8.722	1.866	129.94
6.089	0.662	9.100	1.949	133.92
7.485	0.640	9.512	2.046	138.38
9.211	0.619	9.961	2.160	143.38
11.380	0.597	10.452	2.294	148.98
14.167	0.575	10.989	2.451	155.24
17.864	0.553	11.581	2.637	162.27
22.870	0.532	12.213	2.849	169.90

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.26

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE: HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY{FT)	PRESSURE+ MOMENTUM(POU NDS)
0.000	2.260	3.876	2.493	217.96
8.150	1.500	3.876	1.733	134.16

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY (FT}	PRESSURE+ MOMENTUM(POUNDS)
8.150	1.500	3.875	1.733	134.16
8.346	1.481	3.885	1.715	132.14
8.531	1.461	3.903	1.698	130.24
8.709	1.442	3.926	1.681	128.42
8.881	1.422	3.953	1.665	126.67
9.047	1.403	3.985	1.649	124.99

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          9.208          1.383          4.020          1.634          123.38
          9.364          1.364          4.059          1.620          121.83
          9.515          1.344          4.101          1.605          120.35
          9.660          1.325          4.146          1.592          118.94
          9.801          1.305          4.195          1.579          117.59
          9.936          1.286          4.247          1.566          116.31
         10.065          1.266          4.303          1.554          115.10
         10.189          1.247          4.362          1.542          113.96
         10.306          1.227          4.425          1.531          112.90
         10.416          1.208          4.491          1.521          111.91
         10.520          1.188          4.561          1.512          111.00
         10.615          1.169          4.635          1.503          110.18
         10.703          1.149          4.713          1.494          109.43
         10.782          1.130          4.796          1.487          108.78
         10.852          1.110          4.883          1.481          108.21
         10.911          1.091          4.974          1.475          107.74
         10.959          1.071          5.071          1.471          107.36
         10.995          1.052          5.173          1.468          107.09
         11.017          1.032          5.280          1.466          106.92
         11.025          1.013          5.393          1.465          106.86
         22.870          1.013          5.393          1.465          106.86
-------------------------END OF HYDRAULIC JUMP ANALYSIS-------------------------
| PRESSURE+MOMENTUM BALANCE OCCURS AT     5.51 FEET UPSTREAM OF NODE 2033.00 |
       DOWNSTREAM DEPTH = 1.746 E"'EET, UPSTREAM CONJUGATE DEPTH = 0.556 E"'EET |

  NODE   2037.00 : HGL = <  535.373>;EGL= <  535.825>;FLOWLINE= <  534.360>

******** ************************************************   ****************
  FLOW PROCESS FROM NODE  2037.00 TO NODE  2037.00 IS CODE =  8
  UPSTREAM NODE  2037.00     ELEVATION =   534.36  (FLOW UNSEALS IN REACH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE E"'LOW =      6.85 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  5.40 FEET/SEC .  VELOCITY HEAD =  0.452 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD} = .2*(  0.452) =  0.090

  NODE  2037.00 : HGL = <  535.915>;EGL= <  535.915>;FLOWLINE= <  534.360>

************** ***************** * ****************************T************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  2037.00            E"'LOWLINE ELEVATION =   534.36
  ASSUMED UPSTREAM CONTROL HGL =    535.37 FOR DOWNSTREAM RUN ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********

*** McMILLIN OTAY RANCH VILLAGE 7 J-14531A ***
*** PRESSURE PIPE FLOW ANALYSIS AT BASIN 2000 (NODE 2107 TO 2106 LATERAL) ***
*** 50-YR STORM EVENT, ULTTIMATE CONDITION BY:PT ***

FILE NAME: A:/2000C.PIP
TIME/DATE OF STUDY: 12:11 09/28/2004

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******************** ******************************************  ****** ****** **
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GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: tt*tt indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
2107.00-	) FRICTION	0.69 De	41.00	0.52*	46.01
2106.00-	} CATCH BASIN	0.69*Dc	41.00	0.69*Dc	41.00
2106.00-		1.01*	22.09	0.69 De	14.51

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

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****************************************  *****  ************** ****** ********
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DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 2107.00 FLOWLINE ELEVATION = 534.80
PIPE FLOW = 3.30 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 535.160 FEET
*NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(0.36 FT.)
IS LESS THAN CRITICAL DEPTH(0.69 FT.)
===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
FOR UPSTREAM RUN ANALYSIS

NODE 2107.00 : **HGL** = < 535.32l>;EGL= < 535.888>;FLOWLINE= < 534.800>

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********** ******** ************************* ***************************** ***
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FLOW PROCESS FROM NODE 2107.00 TO NODE 2106.00 IS CODE = 1
UPSTREAM NODE 2106.00 ELEVATION = 540.77 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 3.30 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 398.54 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.52 CRITICAL DEPTH(FT) = 0.69

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.69

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY (FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.692	4.141	0.958	41.00
0.014	0.685	4.195	0.959	41.01
0.058	0.678	4.251	0.959	41.03
0.135	0.671	4.309	0.960	41.06
0.247	0.664	4.368	0.961	41.11
0.399	0.657	4.429	0.962	41.17
0.596	0.650	4.491	0.964	41.25
0.841	0.643	4.555	0.966	41.34
1.141	0.636	4.621	0.968	41.45
1.503	0.630	4.689	0.971	41.58
1.935	0.623	4.758	0.974	41.72
2.448	0.616	4.830	0.978	41.88
3.053	0.609	4.903	0.982	42.05
3.766	0.602	4.979	0.987	42.25
4.605	0.595	5.057	0.992	42.46
5.597	0.588	5.137	0.998	42.69
6.773	0.581	5.219	1.004	42.95
8.177	0.574	5.305	1.011	43.22
9.872	0.567	5.392	1.019	43.51
11.948	0.560	5.483	1.027	43.83
14.546	0.553	5.576	1.036	44.17
17.902	0.546	5.672	1.046	44.53
22.458	0.539	5.772	1.057	44.92
29.207	0.532	5.875	1.068	45.33
41.337	0.525	5.981	1.081	45.76
398.540	0.521	6.040	1.088	46.01

NODE 2106.00 : **HGL** = < 541.462>;EGL= < 541.728>;FLOWLINE= < 540.770>

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

FLOW PROCESS FROM NODE 2106.00 TO NODE 2106.00 IS CODE = 8
UPSTREAM NODE 2106.00 ELEVATION = 540.77 (FLOW IS SUBCRITICAL)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 3.30 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 4.14 FEET/SEC. VELOCITY HEAD = 0.266 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.266) = 0.053

NODE 2106.00 : **HGL** = < 541.782>;EGL= < 541.782>;FLOWLINE= < 540.770>

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

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 2106.00 FLOWLINE ELEVATION = 540.77
ASSUMED UPSTREAM CONTROL **HGL** = 541.46 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

```
**************************************************************    ***************
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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY ***************************
  * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A  *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 2000 (NODE 2030 TO 2100 LATERAL)    *
  * 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT     *
 ***************************************** ******************************

  FILE NAME: A:/2000D.PIP
  TIME/DATE OF STUDY:  11:56 09/28/2004

**************************************************************************** ******
                GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                          NODAL POINT STATUS TABLE
                  (Note: "*" indicates nodal point data used.)
                        UPSTREAM RUN                    DOWNSTREAM RUN
    NODE    MODEL     PRESSURE       PRESSURE+          FLOW          PRESSURE+
   NUMBER   PROCESS   HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOMENTUM(POUNDS)
        2030.00-                0.69 De            40.68         0.41*              57.99
          } FRICTION
        2100.00-               0.69*Dc            40.68         0.69*Dc            40.68
          ) CATCH BASIN
        2100.00-               1.01*              21.91         0.69 De            14.40

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS .
**************************************************************    ***********
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  2030.00           FLOWLINE ELEVATION =   541.46
  PIPE FLOW =       3.28 CFS       PIPE DIAMETER =  18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   541.710 FEET
  *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(   0.25 FT.}
         IS LESS THAN CRITICAL DEPTH(   0.69 FT.)
  ==> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
      FOR UPSTREAM RUN ANALYSIS

  NODE  2030.00 : HGL = <  541.866>;EGL= <  542.986>;FLOWLINE= <  541.460>

 ***************.************************************************************
  FLOW PROCESS FROM NODE  2030.00 TO NODE  2100.00 IS CODE =  1
  UPSTREAM NODE  2100.00     ELEVATION =   542.21   (FLOW IS SUPERCRITICAL)
```

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 3.28 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 7.50 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.32 CRITICAL DEPTH(FT) = 0.69

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.69

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.690	4.132	0.955	40.68
0.007	0.675	4.251	0.956	40.71
0.028	0.660	4.377	0.958	40.80
0.065	0.645	4.510	0.961	40.97
0.121	0.630	4.651	0.967	41.20
0.198	0.616	4.801	0.974	41.51
0.299	0.601	4.960	0.983	41.89
0.427	0.586	5.129	0.995	42.37
0.586	0.571	5.309	1.009	42.93
0.782	0.556	5.501	1.026	43.59
1.020	0.541	5.707	1.047	44.35
1.307	0.526	5.927	1.072	45.23
1.654	0.512	6.163	1.102	46.23
2.070	0.497	6.417	1.137	47.36
2.572	0.482	6.691	1.177	48.64
3.177	0.467	6.987	1.225	50.07
3.912	0.452	7.307	1.282	51.68
4.810	0.437	7.654	1.347	53.48
5.921	0.422	8.032	1.425	55.50
7.317	0.408	8.444	1.515	57.75
7.500	0.406	8.488	1.526	57.99

NODE 2100.00 : **HGL** = < 542.900>;EGL= < 543.165>;FLOWLINE= < 542.210>

FLOW PROCESS FROM NODE 2100.00 TO NODE 2100.00 IS CODE = 8
UPSTREAM NODE 2100.00 ELEVATION = 542.21 (FLOW IS SUBCRITICAL)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 3.28 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 4. 14 FEET/SEC. VELOCITY HEAD = 0.266 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.266) = 0.053

NODE 2100.00 : **HGL** = < 543.218>;EGL= < 543.218>;FLOWLINE= < 542.210>

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 2100.00 FLOWLINE ELEVATION = 542.21
ASSUMED UPSTREAM CONTROL **HGL** = 542.90 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

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**********************************************************************     ******
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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                              San Diego, California 92110
                            619-291-0707    Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
  * McMILLIN OTAY RANCH VILLAGE 7                                J-14531A    *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 2000 (NODE 2019 TO 2020 LATERAL)  *
* 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT   *
 ************************************** ****************************

  FILE NAME: A:/2000E.PIP
  TIME/DATE OF STUDY: 10:49 09/28/2004

********   ***************************************************************
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                         NODAL POINT STATUS TABLE
                  (Note: "*" indicates nodal point data used.)
                        UPSTREAM RUN                    DOWNSTREAM RUN
   NODE      MODEL     PRESSURE       PRESSURE+          FLOW          PRESSURE+
  NUMBER    PROCESS    HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOME'.NTUM(POUNDS)
 2019.00-                1.94*             160.42         0.55                96.14
        1 FRICTION
 2020.00-                1.30*              93.15         0.87 De             73.38
        } CATCH BASIN
 2020.00-                1.49*              75.09         0.87 De             25.14

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**********************************************************************   ******* **
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  2019.00           FLOWLINE ELEVATION =   549.40
 PIPE FLOW =       5.16 CFS       PIPE DIAMETER =  18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   551.340 FEET

 NODE  2019.00 : HGL = <  551.340>;EGL= <  551.472>;FLOWLINE= <  549.400>

************************************************************************** ***
 FLOW PROCESS FROM NODE  2019.00 TO NODE  2020.00 IS CODE =  1
 UPSTREAM NODE  2020.00     ELEVATION =   550.03  (FLOW SEALS IN REACH)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW           5.16 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =       6.25 FEET          MANNING'S N     0.01300
=======  ========================;==============  ==========     =======
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 DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     1.94

 PRESSURE FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM       PRESSURE   VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)        HEAD(FT)   (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
        0.000          1.940      2.920          2.072           160.42
        4.472          1.500      2.920          1.632           111.90

 NORMAL DEPTH(FT) =      0.40          CRITICAL DEPTH(FT) =      0.87

 ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =     1.50

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)          (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
        4.472          1.500      2.919          1.632           111.90
        4.717          1.475      2.930          1.608           109.25
        4.952          1.450      2.949          1.585           106.71
        5.182          1.425      2.975          1.562           104.24
        5.407          1.400      3.005          1.540           101.85
        5.627          1.375      3.040          1.519            99.54
        5.842          1.350      3.080          1.497            97.30
        6.054          1.325      3.123          1.476            95.14
        6.250          1.301      3.168          1.457            93.15

 NODE  2020.00 : HGL = <  551.331>;EGL= <  551.487>;FLOWLINE=  <  550.030>

************************************************************   ************** *
 FLOW PROCESS FROM NODE  2020.00 TO NODE  2020.00 IS CODE =  8
 UPSTREAM NODE  2020.00     ELEVATION =   550.03   (FLOW IS SUBCRITICAL)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       5.16 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =   3.17 FEET/SEC.    VELOCITY HEAD =  0.156 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.156) =  0.031

 NODE  2020.00 : HGL = <  551.518>;EGL= <  551.518>;FLOWLINE=  <  550.030>

*****   ***************************************************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  2020.00           FLOWLINE ELEVATION =   550.03
 ASSUMED UPSTREAM CONTROL HGL =   550.90 FOR DOWNSTREAM RUN ANALYSIS

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 END OF GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared *by:*

RICK ENGINEERING COMPANY
5620 Friars Road
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619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********

*** McMILLIN OTAY RANCH VILLAGE 7 J-14531A ***
*** PRESSURE PIPE FLOW ANALYSIS AT BASIN 2000 (NODE 2019 TO 2025 LATERAL) ***
*** 50-YR STORM EVENT, ULTIMATE CONDITION BY:PT ***

FILE NAME: A:/2000F.PIP
TIME/DATE OF STUDY: 11:04 09/28/2004

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****************** ****************************************************  *******
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GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
2019.00-	) FRICTION	1.94*	153.92	0.57	74.21
2025.00-	) CATCH BASIN	1.37*	92.47	0.82 De	62.23
2025.00-		1.51 *	83.38	0.82 De	21.56

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

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***** ************ ******* ************************************  ************ ****
```

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 2019.00 FLOWLINE ELEVATION = 549.40
PIPE FLOW = 4.55 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 551.340 FEET

NODE 2019.00 : **HGL** = < 551.340>;EGL= < 551.443>;FLOWLINE= < 549.400>

```
*********************   ********************************** ***************** *
```

FLOW PROCESS FROM NODE 2019.00 TO NODE 2025.00 IS CODE = 1
UPSTREAM NODE 2025.00 ELEVATION = 550.00 (FLOW SEALS IN REACH)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 4.55 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 22.25 FEET MANNING'S N 0.01300

```
  DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     1.94
========================================================== ==================
  PRESSURE FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       PRESSURE    VELOCITY      SPECIFIC         PRESSURE+
   CONTROL{FT)        HEAD(FT)    (FT/SEC)     ENERGY(FT}     MOMENTUM(POUNDS)
          0.000          1.940       2.575          2.043           153.92
         17.538          1.500       2.575          1.603           105.41

  NORMAL DEPTH(FT) =      0.53          CRITICAL DEPTH(FT) =      0.82

  ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =      1.50

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC         PRESSURE+
   CONTROL{FT)           (FT)    (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
         17.538          1.500       2.574          1.603           105.41
         18.586          1.473       2.585          1.577           102.50
         19.600          1.446       2.604          1.551            99.69
         20.594          1.418       2.630          1.526            96.96
         21.569          1.391       2.660          1.501            94.31
         22.250          1.372       2.685          1.484            92.47

  NODE   2025.00 : HGL = <  551.372>;EGL= <  551.484>;FLOWLINE= <  550.000>

********** ************************************************************   ***** * **
  FLOW PROCESS FROM NODE  2025.00 TO NODE  2025.00 IS CODE =  8
  UPSTREAM NODE  2025.00     ELEVATION =   550.00   (FLOW UNSEALS  IN REACH}

  CALCULATE  CATCH  BASIN  ENTRANCE  LOSSES(LACFCD) :
  PIPE FLOW =       4.55 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW  VELOCITY  =  2.69  FEET/SEC.    VELOCITY  HEAD  =  0.112 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.112) =  0.022

  NODE   2025.00 : HGL = <  551.506>;EGL= <  551.506>;FLOWLINE= <  550.000>

************ ***********************************************  ** **************
  UPSTREAM  PIPE FLOW CONTROL DATA:
  NODE NUMBER =  2025.00            FLOWLINE ELEVATION  =   550.00
  ASSUMED  UPSTREAM CONTROL HGL =    550.82 FOR DOWNSTREAM  RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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**************************************************************************
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                       619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
  * McMILLIN OTAY RANCH VILLAGE 7                                J-14531A  *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 2000 (NODE 2101 TO 2102 LATERAL)  *
* 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT    *
 *********************  ***************************************************

  FILE NAME: A:/2000G .PIP
  TIME/DATE OF STUDY: 11:09 09/28/2004

**************************************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                      UPSTREAM RUN                  DOWNSTREAM RUN
   NODE    MODEL     PRESSURE      PRESSURE+         FLOW         PRESSURE+
  NUMBER   PROCESS   HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
 2101.00-              0.66 De          36.41        0.38*            52.51
        ) FRICTION
 2102.00-              0.66*Dc          36.41        0.66*Dc          36.41
        } CATCH BASIN
 2102.00-              0.96*            19.56        0.66 De          12.95

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
******** *****************  ***********************************  **************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  2101.00            FLOWLINE ELEVATION =   550.21
 PIPE FLOW =       3.01 CFS        PIPE DIAMETER =  18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =  550.540 FEET
  *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(  0.33 FT.)
         IS LESS THAN CRITICAL DEPTH(  0.66 FT.)
 ===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
      FOR UPSTREAM RUN ANALYSIS

 NODE  2101.00 : HGL = <  550.595>;EGL= <  551.690>;FLOWLINE= <  550.210>

**************************************************************************
 FLOW PROCESS FROM NODE  2101.00 TO NODE  2102.00 IS CODE =  1
 UPSTREAM NODE  2102.00     ELEVATION =   557.67  (FLOW IS SUPERCRITICAL)
```

```
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          3.01 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =    172.68 FEET          MANNING'S N     0.01300

 NORMAL DEPTH(FT) =      0.38          CRITICAL DEPTH(FT) =      0.66
==========================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.66

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH   VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)          (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
        0.000          0.660       4.021         0.911           36.41
        0.010          0.648       4.114         0.911           36.43
        0.042          0.637       4.211         0.912           36.48
        0.098          0.626       4.312         0.915           36.57
        0.181          0.614       4.418         0.918           36.70
        0.294          0.603       4.529         0.922           36.88
        0.441          0.592       4.646         0.927           37.09
        0.625          0.580       4.768         0.933           37.35
        0.854          0.569       4.896         0.941           37.66
        1.131          0.558       5.031         0.951           38.02
        1.466          0.546       5.173         0.962           38.43
        1.866          0.535       5.322         0.975           38.89
        2.342          0.524       5.479         0.990           39.42
        2.909          0.512       5.646         1.007           40.01
        3.584          0.501       5.821         1.027           40.66
        4.389          0.490       6.007         1.050           41.38
        5.353          0.478       6.204         1.076           42.18
        6.517          0.467       6.413         1.106           43.06
        7.937          0.456       6.635         1.140           44.03
        9.696          0.444       6.871         1.178           45.10
       11.921          0.433       7.122         1.221           46.26
       14.830          0.422       7.391         1.270           47.53
       18.824          0.410       7.678         1.326           48.92
       24.813          0.399       7.985         1.390           50.45
       35.709          0.388       8.315         1.462           52.11
      172.680          0.385       8.393         1.480           52.51
---------------------- ------------------------------------------------------
 NODE  2102.00 : HGL = <  558.330>;EGL= <  558.581>;FLOWLINE= <  557.670>

********************** ************************** ************ ***************
 FLOW PROCESS FROM NODE  2102.00 TO NODE  2102.00 IS CODE =  8
 UPSTREAM NODE  2102.00     ELEVATION =   557.67  (FLOW IS SUBCRITICAL)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       3.01 CFS         PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY  =  4.02 FEET/SEC.   VELOCITY HEAD =  0.251 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.251) =  0.050

 NODE  2102.00 : HGL = <  558.631>;EGL= <  558.631>;FLOWLINE= <  557.670>

**************************************************************************     ****
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER    2102.00          FLOWLINE ELEVATION =   557.67
 ASSUMED UPSTREAM CONTROL HGL =    558.33 FOR DOWNSTREAM RUN ANALYSIS
```

END OF GRADUALLY VARIED FLOW ANALYSIS

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Analysis prepared by:

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DESCRIPTION OF STUDY

McMILLIN OTAY RANCH VILLAGE 7 J-14531A
PRESSURE PIPE ANALYSIS AT BASIN 2000 (NODE 2015 TO 2016 LATERAL)
50-YR STORM EVENT, ULTIMATE CONDITION BY: PT

FILE NAME: A:/2000H.PIP
TIME/DATE OF STUDY: 11:36 09/28/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD (FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW Dl::PTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
2015.00-		0.78	28.36	0.24*	46.90
}	FRICTION				
2016.00-		0.55*Dc	22.80	0.55*Dc	22.80
}	CATCH BASIN				
2016.00-		0.79*	12.15	0.55 De	8.22

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD, LACFCD, AND OCEMA DESIGN MANUALS.•

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 2015.00 FLOWLINE ELEVATION = 556.97
PIPE FLOW = 2.09 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 557.750 FEET

NODE 2015.00 : **HGL** = < 557.212>;EGL= < 559.195>;FLOWLINE= < 556.970>

FLOW PROCESS FROM NODE 2015.00 TO NODE 2016.00 IS CODE = 1
UPSTREAM NODE 2016.00 ELEVATION = 559.72 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 2.09 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 22.25 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.24 CRITICAL DEPTH(FT) = 0.55

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.55

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.545	3.598	0.747	22.80
0.005	0.533	3.710	0.747	22.82
0.019	0.521	3.828	0.749	22.88
0.045	0.509	3.953	0.752	22.98
0.083	0.497	4.086	0.756	23.12
0.135	0.485	4.227	0.762	23.31
0.204	0.473	4.377	0.770	23.55
0.292	0.461	4.537	0.780	23.85
0.401	0.448	4.708	0.793	24.20
0.536	0.436	4.891	0.808	24.61
0.700	0.424	5.087	0.826	25.09
0.899	0.412	5.298	0.848	25.63
1.139	0.400	5.524	0.874	26.26
1.428	0.388	5.769	0.905	26.97
1.777	0.376	6.033	0.941	27.77
2.200	0.364	6.319	0.984	28.67
2.714	0.351	6.629	1.034	29.69
3.345	0.339	6.968	1.094	30.83
4.128	0.327	7.338	1.164	32.11
5.114	0.315	7.744	1.247	33.54
6.384	0.303	8.191	1.345	35.15
8.075	0.291	8.685	1.463	36.96
10.441	0.279	9.232	1.603	39.01
14.058	0.266	9.843	1.772	41.31
20.773	0.254	10.526	1.976	43.93
22.250	0.242	11.296	2.225	46.90

NODE 2016.00 : **HGL** = < 560.265>;EGL= < 560.467>;FLOWLINE= < 559.720>

****** FLOW PROCESS FROM NODE 2016.00 TO NODE 2016.00 IS CODE = 8 ***

FLOW PROCESS FROM NODE 2016.00 TO NODE 2016.00 IS CODE = 8
UPSTREAM NODE 2016.00 ELEVATION = 559.72 (FLOW IS SUBCRITICAL)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 2.09 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 3.60 FEET/SEC . VELOCITY HEAD = 0.201 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.201) = 0.040

NODE 2016.00 : **HGL** = < 560.507>;EGL= < 560.507>;FLOWLINE= < 559.720>

****

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 2016.00 FLOWLINE ELEVATION = 559.72
ASSUMED UPSTREAM CONTROL **HGL** = 560.27 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

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Analysis prepared by:

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619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 2000 (NODE 2008 TO 2009 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *

FILE NAME: A:/2000I.PIP
TIME/DATE OF STUDY: 11:39 09/28/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD (FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
2008.00-		1.60*	107.95	0.44	62.67
	} FRICTION				
2009.00-		0.86*	48.12	0.72 De	45.88
	} CATCH BASIN				
2009.00-		1.08*	31.31	0.72 De	16.16

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

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

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 2008.00 FLOWLINE ELEVATION = 562.91
PIPE FLOW = 3.60 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 564.510 FEET

NODE 2008.00 : **HGL** = < 564.510>;EGL= < 564.574>;FLOWLINE= < 562.910>

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

FLOW PROCESS FROM NODE 2008.00 TO NODE 2009.00 IS CODE = **1**
UPSTREAM NODE 2009.00 ELEVATION = 563.54 (FLOW SEALS IN REACH)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 3.60 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 6.25 FEET MANNING'S N = 0.01300

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 1.60

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.600	2.037	1.664	107.95
1.004	1.500	2.037	1.564	96.91

NORMAL DEPTH(FT) = 0.33 CRITICAL DEPTH(FT) = 0.72

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
1.004	1.500	2.037	1.564	96.91
1.309	1.469	2.047	1.534	93.57
1.608	1.438	2.066	1.504	90.31
1.903	1.407	2.090	1.475	87.13
2.194	1.376	2.120	1.446	84.03
2.483	1.345	2.154	1.417	81.01
2.767	1.314	2.193	1.389	78.07
3.049	1.283	2.236	1.361	75.23
3.326	1.252	2.284	1.333	72.48
3.600	1.221	2.337	1.306	69.83
3.869	1.190	2.394	1.279	67.28
4.133	1.159	2.457	1.252	64.85
4.392	1.128	2.525	1.227	62.53
4.645	1.097	2.600	1.202	60.32
4.891	1.066	2.681	1.177	58.25
5.129	1.035	2.768	1.154	56.30
5.357	1.004	2.864	1.131	54.50
5.576	0.973	2.968	1.109	52.83
5.782	0.941	3.082	1.089	51.32
5.974	0.910	3.206	1.070	49.97
6.149	0.879	3.342	1.053	48.79
6.250	0.859	3.438	1.043	48.12

NODE 2009.00 : **HGL** = < 564.399>;EGL= < 564.583>;FLOWLINE= < 563.540>

FLOW PROCESS FROM NODE 2009.00 TO NODE 2009.00 IS CODE = 8
UPSTREAM NODE 2009.00 ELEVATION = 563.54 (FLOW IS SUBCRITICAL)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 3.60 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 3.44 FEET/SEC. VELOCITY HEAD = 0.183 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.183) = 0.037

NODE 2009.00 : **HGL** = < 564.620>;EGL= < 564.620>;FLOWLINE= < 563.540>

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 2009.00 FLOWLINE ELEVATION = 563.54
ASSUMED UPSTREAM CONTROL **HGL** = 564.26 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

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************************************     *    ************************************
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                                Analysis prepared by:

                              RICK ENGINEERING COMPANY
                                  5620 Friars Road
                                San Diego, California 92110
                               619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY ***********************  *****
  * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A   *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 2000 (NODE 2008 TO 2012 LATERAL)     *
  * 50-YR STORM EVENT, ULTIMATE CONDIITON                            BY:PT   *
 ************************************************************************

  FILE NAME: A:/2000J.PIP
  TIME/DATE OF STUDY: 11:50 09/28/2004

************************************    ****************************************
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                         NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                      UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL    PRESSURE       PRESSURE+         FLOW          PRESSURE+
  NUMBER   PROCESS   HEAD(FT)   MOMENTUM(POUNDS)    DEPTH (FT)   MOMENTUM( POUNDS)
 2008.00-              1.60*            99.24         0.28              44.81
        ) FRICTION          } HYDRAULIC JUMP
 2012. 00-             0.57*Dc           24.91         0.57*Dc           24.91
        ) CATCH BASIN
 2012.00-              0.82*             13.29         0.57 De            8.96

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD, LACFCD, AND OCEMA
 DESIGN MANUALS.
*****************************************************************   *****   ******
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  2008.00            FLOWLINE ELEVATION  =  562.91
 PIPE FLOW  =     2.24 CFS       PIPE DIAMETER  =   18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   564.510 FEET

 NODE  2008.00 : HGL = <  564.510>;EGL= <  564.535>;FLOWLINE= <  562.910>

*****************************************************************     ******
 FLOW PROCESS FROM NODE  2008.00 TO NODE  2012.00 IS CODE =  1
 UPSTREAM NODE  2012.00     ELEVATION =   565.14   (HYDRAULIC JUMP OCCURS)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW           2.24 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =      22.25 FEET          MANNING'S N     0.01300
```

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.26 CRITICAL DEPTH(FT) = 0.57

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.57

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.565	3.673	0.775	24.91
0.005	0.553	3.782	0.776	24.93
0.023	0.541	3.897	0.777	24.99
0.053	0.529	4.018	0.780	25.09
0.098	0.517	4.146	0.784	25.23
0.160	0.505	4.282	0.790	25.43
0.241	0.493	4.427	0.798	25.67
0.344	0.481	4.580	0.807	25.96
0.472	0.469	4.744	0.819	26.31
0.629	0.457	4.918	0.833	26.71
0.821	0.445	5.104	0.850	27.18
1.052	0.433	5.304	0.870	27.72
1.330	0.421	5.517	0.894	28.34
1.664	0.409	5.746	0.922	29.04
2.067	0.396	5.993	0.955	29.82
2.552	0.384	6.259	0.993	30.70
3.141	0.372	6.547	1.038	31.69
3.861	0.360	6.859	1.091	32.79
4.750	0.348	7.198	1.153	34.02
5.866	0.336	7.568	1.226	35.40
7.297	0.324	7.972	1.312	36.94
9.195	0.312	8.415	1.412	38.66
11.839	0.300	8.904	1.532	40.58
15.863	0.288	9.443	1.673	42.74
22.250	0.277	9.954	1.817	44.81

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 1.60

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.600	1.268	1.625	99.24
1.003	1.500	1.268	1.525	88.20

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH {FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
1.003	1.500	1.267	1.525	88.20
1.374	1.463	1.276	1.488	84.13
1.742	1.425	1.291	1.451	80.13
2.108	1.388	1.312	1.415	76.20

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          2.473          1.350      1.336          1.378          72.36
          2.835          1.313      1.365          1.342          68.62
          3.195          1.276      1.398          1.306          64.98
          3.554          1.238      1.435          1.270          61.45
          3.910          1.201      1.476          1.235          58.04
          4.263          1.164      1.522          1.200          54.76
          4.613          1.126      1.573          1.165          51.60
          4.960          1.089      1.630          1.130          48.59
          5.303          1.051      1.692          1.096          45.71
          5.641          1.014      1.761          1.062          42.99
          5.974          0.977      1.838          1.029          40.41
          6.300          0.939      1.923          0.997          38.00
          6.618          0.902      2.018          0.965          35.76
          6.927          0.865      2.123          0.935          33.70
          7.223          0.827      2.241          0.905          31.81
          7.505          0.790      2.374          0.877          30.13
          7.769          0.752      2.524          0.851          28.64
          8.009          0.715      2.694          0.828          27.38
          8.218          0.678      2.889          0.807          26.35
          8.388          0.640      3.112          0.791          25.58
          8.505          0.603      3.371          0.779          25.09
          8.550          0.565      3.673          0.775          24.91
         22.250          0.565      3.673          0.775          24.91
------------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
1 PRESSURE+MOMENTUM BALANCE OCCURS AT     5.64 FEET UPSTREAM OF NODE 2008.00
       DOWNSTREAM DEPTH = 1.014 FEET, UPSTREAM CONJUGATE DEPTH = 0.287 FEET

  NODE   2012.00 : HGL = <  565.706>;EGL= <  565.915>;FLOWLINE= <  565.140>

***************** ************************************  ************** **********
  FLOW PROCESS FROM NODE  2012.00 TO NODE  2012.00 IS CODE =  8
  UPSTREAM NODE  2012.00     ELEVATION =   565.14   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       2.24 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY  =  3.67  FEET/SEC.    VELOCITY  HEAD  =  0.210 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*{  0.210) =  0.042

  NODE   2012.00 : HGL = <  565.957>;EGL= <  565.957>;FLOWLINE= <  565.140>

***************************** ************* *** ** ******************* ******** *
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  2012.00            FLOWLINE ELEVATION =   565.14
  ASSUMED UPSTREAM CONTROL HGL =    565.71 FOR DOWNSTREAM RUN ANALYSIS

==========================================================================   ==
  END OF GRADUALLY VARIED FLOW ANALYSIS
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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 2000 (NODE 2004 TO 2005 LATERAL)   *
* 50-YR STORM EVENT, ULTIMATE CONDITION                            BY:PT  *
 ************** k ********************* ********************** ********* ********

  FILE NAME: A:/2000K.PIP
  TIME/DATE OF STUDY: 19:04 09/20/2004

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

               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                  (Note: "*" indicates nodal point data used.)
                        UPSTREAM RUN                    DOWNSTREAM RUN
    NODE     MODEL    PRESSURE      PRESSURE+          FLOW          PRESSURE+
   NUMBER  PROCESS   HEAD(FT)    MOMENTUM (POUNDS)   DEPTH(FT)    MOMENTUM(POUNDS)
  2004.00-              0.91*              35.19        0.39     26.82
         } FRICTION          } HYDRAULIC JUMP
  2005.00-              0.55*Dc            22.94        0.55*Dc            22.94
         )CATCH BASIN
  2005.00-              0.79*              12.23        0.55 De             8.27

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**********************  ************************************  *****************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  2004.00            FLOWLINE ELEVATION     565.93
  PIPE FLOW =       2.10 CFS        PIPE DIAMETER =  18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   566.840 FEET

  NODE   2004.00 : HGL = <  566.840>;EGL= <  566.894>;FLOWLINE= <  565.930>

************************  ***************************** ********************  ***
  FLOW PROCESS FROM NODE  2004.00 TO NODE  2005.00 IS CODE =  1
  UPSTREAM NODE  2005.00     ELEVATION =   566.38  (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          2.10 CFS      PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =      22.25 FEET          MANNING'S N     0.01300
```

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.38 CRITICAL DEPTH(FT) = 0.55

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.55

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.547	3.603	0.749	22.94
0.011	0.540	3.664	0.749	22.94
0.044	0.533	3.726	0.749	22.96
0.102	0.527	3.791	0.750	22.99
0.187	0.520	3.857	0.751	23.03
0.302	0.513	3.926	0.753	23.09
0.452	0.507	3.997	0.755	23.15
0.638	0.500	4 .070	0.758	23.24
0.867	0.493	4.146	0.761	23.33
1.144	0.487	4.224	0.764	23.44
1.475	0.480	4.305	0.768	23.57
1.867	0.473	4.389	0.773	23.71
2.332	0.467	4.476	0.778	23.86
2.881	0.460	4.566	0.784	24.04
3.528	0.453	4.660	0.791	24.23
4.294	0.447	4.757	0.798	24.44
5.204	0.440	4.857	0.807	24.66
6.293	0.433	4.962	0.816	24.91
7.611	0.427	5.070	0.826	25.18
9.227	0.420	5.183	0.837	25.47
11.255	0.413	5.301	0.850	25.78
13.879	0.407	5.423	0.864	26.11
17.449	0.400	5.550	0.879	26.47
22.250	0.394	5.670	0.893	26.82

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.91

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.910	1.871	0.964	35.19
0.641	0.896	1.908	0.952	34.33
1.276	0.881	1.946	0.940	33.49
1.905	0.866	1.985	0.928	32.68
2.527	0.852	2.026	0.916	31.90
3.143	0.837	2.070	0.904	31.15
3.750	0.823	2.115	0.892	30.42
4.349	0.808	2.162	0.881	29.73
4.938	0.794	2.212	0.870	29.06
5.517	0.779	2.263	0.859	28.42
6.084	0.765	2.318	0.848	27.81
6.639	0.750	2.375	0.838	27.23
7.180	0.736	2.435	0.828	26.68
7.705	0.721	2.498	0.818	26.17

```
          8.212          0.707      2.565          0.809          25.69
          8.700          0.692      2.635          0.800          25.24
          9.166          0.678      2.708          0.792          24.83
          9.607          0.663      2.786          0.784          24.45
         10.020          0.649      2.869          0.776          24.11
         10.400          0.634      2.956          0.770          23.82
         10.744          0.619      3.048          0.764          23.56
         11.046          0.605      3.146          0.759          23.34
         11.298          0.590      3.250          0.755          23.17
         11.493          0.576      3.360          0.751          23.04
         11.620          0.561      3.478          0.749          22.96
         11.665          0.547      3.603          0.749          22.94
         22.250          0.547      3.603          0.749          22.94
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
 PRESSURE+MOMENTUM BALANCE OCCURS AT     7.69 FEET UPSTREAM OF NODE 2004.00
       DOWNSTREAM DEPTH = 0.722 FEET, UPSTREAM CONJUGATE DEPTH = 0.405 FEET

  NODE  2005.00 : HGL = <  566.927>;EGL= <  567.129>;FLOWLINE= <  566.380>

***********   ************************************************************
  FLOW PROCESS FROM NODE  2005.00 TO NODE  2005.00 IS CODE =  8
  UPSTREAM NODE  2005.00     ELEVATION =   566.38   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       2.10 CFS         PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY  =  3.60 FEET/SEC.  VELOCITY HEAD =  0.202 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.202) =  0.040

  NODE  2005.00 : HGL = <  567.169>;EGL= <  567.169>;FLOWLINE=  <  566.380>

************************************************************************** ***
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  2005.00           FLOWLINE ELEVATION =   566.38
  ASSUMED UPSTREAM CONTROL HGL =   566.93 FOR DOWNSTREAM RUN ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
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50 year 3024 - 3005

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
(Reference: LACFCD, LACRD, AND OCEMA HYDRAULICS CRITERION)
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DESCRIPTION OF STUDY

* McMILLIN OTAY RANCH VILLAGE 7 J-14531A *
* PRESSURE PIPE FLOW ANALYSIS BASIN 3000 (NODE 3038 TO 3005 LATERAL} *
* 50-YR STORM EVENT, ULTIMATE CONDITION BY: P'I' *

FILE NAME: 3024C.PIP
TIME/DATE OF STUDY: 09:42 11/15/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
3024.00	FRICTION	3.21*	964.89	1.53	700.03
3015.00	JUNCTION	2.77*	831.36	1..33	769.92
3015.00	FRICTION	2.77*	767.05	1.12	757.16
	) HYDRAULIC JUMP				
3007.00	JUNCTION	1.79*Dc	577.98	l.79*De	577.98
3007.00	FRICTION	1.89*	369.12	1.48	342.49
3003.00	JUNCTION	1.62*	344.57	1.51 De	342.28
3003.00	FRICTION	2.07*	287.77	0.94	204.02
	) HYDRAULIC JUMP				
3045.00	JUNCTION	l.20*Dc	187.43	l.20*Dc	187.43
3045.00	FRICTION	1.96*	271.75	1.28 De	210.95
3555.00	FRICTION+ BEND	2.02•	277.64	1.28 De	210.95
3055.00	FRICTION	2.13*	289.64	1.28 De	210.95
3055.00	MANHOLE	2.43*	322.83	0.87	254.41
3555.00	FRICTION	2.13*	289.89	0.95	236.94
	) HYDRAULIC JUMP				
3005.00	CATCH BASIN	l.28*Dc	210.95	l.28*Dc	210.95
3005.00		2.19*	158.52	1.28 De	59.32

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

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  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**********************************************************************    *******
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3024.00            FLOWLINE ELEVATION =   519.80
  PIPE FLOW =      30.40 CFS        PIPE DIAMETER =  30.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   523.009 FEET

  NODE  3024.00 : HGL = <  523.009>;EGL= <  523.605>;FLOWLINE= <  519.800>

**************************************************************************
  FLOW PROCESS FROM NODE  3024.00 TO NODE  3015.00 IS CODE =  1
  UPSTREAM NODE  3015.00     ELEVATION =   520.77   (FLOW IS UNDER PRESSURE)

  CALCULATE FRICTION LOSSES (LACFCD):
  PIPE FLOW          30.40 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH        97.23 FEET          MANNING'S N      0.01300
  SF=(Q/K)**2   ((     30.40)/(   410.185))**2 = 0.00549
  HF=L*SF = (     97.23)*(0.00549) =      0.534

  NODE  3015.00 : HGL = <  523.543>;EGL= <  524.139>;FLOWLINE= <  520.770>

 ************************************************************************
  FLOW PROCESS FROM NODE  3015.00 TO NODE  3015.00 IS CODE =  5
  UPSTREAM NODE  3015.00     ELEVATION =   521.00   (FLOW IS UNDER PRESSURE)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW    DIAMETER   ANGLE     FLOWLINE   CRITICAL   VELOCITY
                   (CFS)   (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)  (FT/SEC)
     UPSTREAM      27.57     30.00      0.00     521.00       1.79        5.616
    DOWNSTREAM     30.40     30.00               520.77       1.88        6.193
    LATERAL #1      2.17     18.00     90.00     522.00       0.56        1.228
    LATERAL #2      0.66     18.00     90.00     522.00       0.30        0.373
       Q5           0.00===QS EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00452
  DOWNSTREAM: MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00549
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00501
  JUNCTION LENGTH      4.00 FEET
  FRICTION LOSSES     0.020 FEET         ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (OY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 0.126)+( 0.000) =    0.126

  NODE  3015.00 : HGL = <  523.775>;EGL= <  524.264>;FLOWLINE= <  521.000>

************************    ***********************************.**.*********
  FLOW PROCESS FROM NODE  3015.00 TO NODE  3007.00 IS CODE =  1
  UPSTREAM NODE  3007.00     ELEVATION =   524.19   (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          27.57 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =     101.89 FEET          MANNING'S N      0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT) =      1.07          CRITICAL DEPTH(FT) =     1.79
```

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.79

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPEC FIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.785	7.350	2.624	577.98
0.051	1.756	7.480	2.626	578.28
0.183	1.728	7.616	2.629	579.02
0.404	1.699	7.759	2.634	580.23
0.725	1.670	7.908	2.642	581.93
1.156	1.642	8.065	2.652	584.14
1.710	1.613	8.230	2.665	586.88
2.403	1.584	8.402	2.681	590.18
3.253	1.556	8.584	2.700	594.07
4.280	1.527	8.774	2.723	598.56
5.512	1.498	8.974	2.750	603.70
6.979	1.470	9.185	2.780	609.53
8.720	1.441	9.406	2.816	616.06
10.783	1.412	9.640	2.856	623.36
13.227	1.384	9.886	2.902	631.46
16.133	1.355	10.146	2.954	640.41
19.603	1.326	10.420	3.013	650.27
23.777	1.298	10.710	3.080	661.09
28.854	1.269	11.016	3.155	672.95
35.122	1.240	11.341	3.239	685.90
43.032	1.212	11.686	3.333	700.03
53.336	1.183	12.052	3.440	715.43
67.450	1.154	12.441	3.559	732.20
88.552	1.126	12.855	3.693	750.44
101.890	1.116	13.006	3.744	757.16

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.77

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(fT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.775	5.617	3.264	767.05
10.247	2.500	5.617	2.990	682.96

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 2.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(E'T)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
10.247	2.500	5.615	2.990	682.96
11.226	2.472	5.626	2.963	674.88
12.133	2.443	5.647	2.939	667.35
12.997	2.415	5.675	2.915	660.18
13.824	2.386	5.707	2.893	653.34
14.619	2.358	5.744	2.871	646.80
15.384	2.330	5.786	2.850	640.54
16.121	2.301	5.831	2.830	634.56
16.831	2.273	5.881	2.810	628.86
17.513	2.244	5.934	2.792	623.43
18.167	2.216	5.990	2.774	618.27

```
        18.794          2.188       6.051          2.757          613.39
        19.392          2.159       6.115          2.740          608.80
        19.960          2.131       6.183          2.725          604.49
        20.497          2.102       6.255          2.710          600.47
        21.002          2.074       6.331          2.697          596.75
        21.473          2.046       6.410          2.684          593.34
        21.908          2.017       6.494          2.673          590.24
        22.305          1.989       6.582          2.662          587.47
        22.660          1.961       6.674          2.653          585.03
        22.972          1.932       6.771          2.644          582.93
        23.237          1.904       6.872          2.637          581.18
        23.451          1.875       6.978          2.632          579.80
        23.610          1.847       7.089          2.628          578.80
        23.710          1.819       7.205          2.625          578.18
        23.744          1.790       7.327          2.624          577.98
       101.890          1.790       7.327          2.624          577.98
----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
1 PRESSURE+MOMENTUM BALANCE OCCURS AT     1.28 FEET UPSTREAM OF NODE 3015.00
I       DOWNSTREAM DEPTH = 2.740 FEET, UPSTREAM CONJUGATE DEPTH = 1.117 FEET I

  NODE   3007.00 : HGL = <   525.975>;EGL= <   526.814>;FLOWLINE= <   524.190>

************************************************************ ************************
  FLOW PROCESS FROM NODE  3007.00 TO NODE  3007.00 IS CODE =  5
  UPSTREAM NODE  3007.00     ELEVATION =   525.19  (FLOW IS AT CRITICAL DEPTH)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW    DIAMETER   ANGLE     FLOWLINE   CRITICAL   VELOCITY
                   (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
     UPSTREAM      17.56     24.00     50.00     525.19       1.51       5.712
    DOWNSTREAM     27.57     30.00               524.19       1.79       7.330
    LATERAL #1     10.01     24.00     62.00     525.19       1.13       4.473
    LATERAL #2      0.00      0.00      0.00       0.00       0.00       0.000
       Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*V l*COS( DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00521
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00608
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00565
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.023 FEET         ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES   ( 0.773)+( 0.000) =   0.773

  NODE   3007.00 : HGL = <   527.0Bl>;EGL= <   527.587>;FLOWLINE= <   525.190>

************************************************************************    ***" **
  FLOW PROCESS FROM NODE  3007.00 TO NODE  3003.00 IS CODE =  1
  UPSTREAM NODE  3003.00     ELEVATION =   525.69  (FLOW IS SUBCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD) :
  PIPE FLOW          17.56 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =      66.65 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      1.48           CRITICAL DEPTH(FT) =      1.51
=  ==========  =  ========  ========================  ;Z;   ========  ==  ===
   OWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.89
====  ========  ==========  ===  ===  ========  =    =======  ======  |  |=====
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
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DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.891	5.710	2.397	369.12
4.569	1.875	5.737	2.387	367.12
8.986	1.860	5.765	2.376	365.19
13.269	1.845	5.795	2.367	363.33
17.432	1.830	5.827	2.357	361.55
21.487	1.814	5.861	2.348	359.85
25.443	1.799	5.896	2.339	358.22
29.306	1.784	5.934	2.331	356.66
33.083	1.769	5.972	2.323	355.18
36.779	1.754	6.013	2.315	353.77
40.396	1.738	6.055	2.308	352.44
43.936	1.723	6.098	2.301	351.18
47.401	1.708	6.144	2.294	350.00
50.790	1.693	6.191	2.288	348.90
54.103	1.677	6.240	2.282	347.88
57.335	1.662	6.290	2.277	346.94
60.482	1.647	6.343	2.272	346.08
63.537	1.632	6.397	2.268	345.30
66.490	1.616	6.453	2.263	344.61
66.650	1.616	6.456	2.263	344.57

NODE 3003.00 : HGL = < 527.306>;EGL= < 527.953>;FLOWLINE= < 525.690>

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

FLOW PROCESS FROM NODE 3003.00 TO NODE 3003.00 IS CODE = 5
UPSTREAM NODE 3003.00 ELEVATION = 526.02 (FLOW UNSEALS IN REACH)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS}	DIAMETER (INCHES}	ANGLE (DEGREES}	FLOWLINE ELEVATION	CRITICAL DEPTH (FT.)	VELOCITY (FT/SEC}
UPSTREAM	11.21	24.00	0.00	526.02	1.20	3.568
DOWNSTREAM	17.56	24.00		525.69	1.51	6.458
LATERAL #1	4.69	18.00	90.00	526.52	0.83	3.147
LATERAL #2	1.66	18.00	60.00	526.52	0.48	1.114
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00246
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00619
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00432
JUNCTION LENGTH 4.00 FEET
FRICTION LOSSES 0.017 FEET ENTRANCE LOSSES 0.000 FEET
JUNCTION LOSSES (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES (0.337)+(0.000) = 0.337

NODE 3003.00 : HGL = < 528.093>;EGL= < 528.290>;FLOWLINE= < 526.020>

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

FLOW PROCESS FROM NODE 3003.00 TO NODE 3045.00 IS CODE = 1
UPSTREAM NODE 3045.00 ELEVATION = 527.49 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES (LACFCD):
PIPE FLOW 11.21 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 115.54 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.93 CRITICAL DEPTH(FT) = 1.20

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.20

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.201	5.688	1.704	187.43
0.027	1.190	5.751	1.704	187.45
0.111	1.179	5.815	1.705	187.52
0.257	1.168	5.881	1.706	187.64
0.472	1.157	5.948	1.707	187.81
0.763	1.146	6.017	1.709	188.03
1.137	1.135	6.088	1.711	188.31
1.604	1.124	6.161	1.714	188.64
2.176	1.114	6.235	1.718	189.02
2.865	1.103	6.311	1.721	189.46
3.687	1.092	6.390	1.726	189.96
4.661	1.081	6.470	1.731	190.51
5.809	1.070	6.552	1.737	191.13
7.162	1.059	6.637	1.743	191.81
8.754	1.048	6.724	1.750	192.56
10.633	1.037	6.813	1.758	193.37
12.860	1.026	6.905	1.767	194.25
15.519	1.015	6.999	1.776	195.20
18.725	1.004	7.096	1.787	196.22
22.649	0.993	7.196	1.798	197.31
27.558	0.982	7.298	1.810	198.49
33.894	0.971	7.404	1.823	199.74
42.490	0.960	7.512	1.837	201.07
55.217	0.950	7.624	1.853	202.48
79.077	0.939	7.739	1.869	203.99
115.540	0.938	7.742	1.870	204.02

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.07

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.073	3.568	2.270	287.77
7.066	2.000	3.568	2.198	273.55

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 2.00

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
7.066	2.000	3.567	2.198	273.55
10.009	1.968	3.579	2.167	267.56
12.804	1.936	3.602	2.138	261.82
15.515	1.904	3.631	2.109	256.27
18.158	1.872	3.666	2.081	250.90
20.741	1.840	3.706	2.054	245.71
23.270	1.808	3.751	2.027	240.69
25.748	1.776	3.800	2.001	235.85

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        28.174          1.744       3.855          1.975          231.18
        30.548          1.712       3.913          1.950          226.71
        32.870          1.680       3.977          1.926          222.43
        35.136          1.648       4.046          1.903          218.35
        37.343          1.616       4.119          1.880          214.47
        39.487          1.585       4.198          1.858          210.81
        41.562          1.553       4.283          1.838          207.37
        43.561          1.521       4.373          1.818          204.17
        45.475          1.489       4.469          1.799          201.20
        47.294          1.457       4.572          1.781          198.49
        49.006          1.425       4.681          1.765          196.04
        50.595          1.393       4.798          1.750          193.86
        52.042          1.361       4.923          1.737          191.97
        53.323          1.329       5.056          1.726          190.39
        54.407          1.297       5.199          1.717          189.12
        55.256          1.265       5.351          1.710          188.20
        55.817          1.233       5.514          1.705          187.62
        56.024          1.201       5.688          1.704          187.43
       115.540          1.201       5.688          1.704          187.43
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
 PRESSURE+MOMENTUM BALANCE OCCURS AT    43.95 FEET UPSTREAM OF NODE 3003.00
       DOWNSTREAM DEPTH = 1.514 FEET, UPSTREAM CONJUGATE DEPTH = 0.942 FEET

  NODE   3045.00 : HGL = <  528.691>;EGL= <  529.194>;FLOWLINE= <  527.490>

**************************** ***************** ****** * * **** *** ***** *** ********
  FLOW PROCESS FROM NODE  3045.00 TO NODE  3045.00 IS CODE =  5
  UPSTREAM NODE  3045.00     ELEVATION =   527.82  (FLOW IS AT CRITICAL DEPTH)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW    DIAMETER    ANGLE    FLOWLINE   CRITICAL   VELOCITY
                   (CFS)    (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
     UPSTREAM      11.21     18.00      90.00    527.82       1.28        6.344
    DOWNSTREAM     11.21     24.00               527.49       1.20        5.690
    LATERAL #1      0.00      0.00       0.00      0.00       0.00        0.000
    LATERAL #2      0.00      0.00       0.00      0.00       0.00        0.000
       QS           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION  LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.01139
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00543
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00841
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.034 FEET         ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES   ( 1.216)+( 0.000) =   1.216

  NODE   3045.00 : HGL = <  529.785>;EGL= <  530.410>;FLOWLINE= <  527.820>

****************************************************  ****************** ****
  FLOW PROCESS FROM NODE  3045.00 TO NODE  3555.00 IS CODE =  1
  UPSTREAM NODE  3555.00     ELEVATION =   528.21  (FLOW IS UNDER PRESSURE)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          11.21 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH        38.49 FEET          MANNING'S N     0.01300
  SF=(Q/K)**2   ((    11.21)/(   105.043))**2=0.01139
  HF=L*SF = (    38.49)*(0.01139)=      0.438
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  NODE   3555.00 : HGL = <  530.223>;EGL= <  530.848>;FLOWLINE= <  528.205>

****************************************   *************** ******************
  FLOW PROCESS FROM NODE  3055.00 TO NODE  3055.00 IS CODE =  3
  UPSTREAM NODE  3055.00     ELEVATION =   528.71   (FLOW IS UNDER PRESSURE)

  CALCULATE PIPE-BEND LOSSES(OCEMA):
  PIPE FLOW =      11.21 CFS             PIPE DIAMETER =  18.00 INCHES
  CENTRAL ANGLE    5.795 DEGREES         MANNING'S N = 0.01300
  PIPE LENGTH =      50.07 FEET          BEND COEFFICIENT(KB) = 0.06344
  FLOW VELOCITY     6.34 FEET/SEC.       VELOCITY HEAD =  0.625 FEET
  HB=KB*(VELOCITY HEAD) = ( 0.063)*( 0.625) =   0.040
  SF=(Q/K)**2 = ((     11.21)/(   105.044))**2 = 0.01139
  HF=L*SF = (     50.07)*(0.01139) =  0.570
  TOTAL HEAD LOSSES = HB + HF = ( 0.040)+( 0.570) =  0.610

  NODE   3055.00 : HGL = <  530.833>;EGL= <  531.458>;FLOWLINE= <  528.706>

**************************   *************** ****************** ************ ****
  FLOW PROCESS FROM NODE  3055.00 TO NODE  3055.00 IS CODE =  1
  UPSTREAM NODE  3055.00     ELEVATION =   530.83   (FLOW IS UNDER PRESSURE)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          11.21 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH       212.93 FEET          MANNING'S N 0.01300
  SF=(QIK)**2    ((     11.21)I(    105.044))**2 =  0.01139
  HF=L*SF = (    212.93)*(0.01139) =      2.425

  NODE   3055.00 : HGL = <  533.258>;EGL= <  533.B83>;FLOWLINE= <  530.830>

******************* ************ ************************ *****.*** *************
  FLOW PROCESS FROM NODE  3555.00 TO NODE  3555.00 IS CODE =  2
  UPSTREAM NODE  3555.00     ELEVATION =   531.16   (FLOW IS UNDER PRESSURE)

  CALCULATE MANHOLE LOSSES(LACFCD):
  PIPE FLOW =      11.21 CFS           PIPE DIAMETER    18.00 INCHES
  FLOW VELOCITY =   6.34 FEET/SEC.     VELOCITY HEAD    0.625 FEET
  HMN = .05*(VELOCITY HEAD) = .05*( 0.625) =  0.031

  NODE   3555.00 : HGL = <  533.289>;EGL= <  533.914>;FLOWLINE= <  531.160>

****************************************************************************
  FLOW PROCESS FROM NODE  3555.00 TO NODE  3005.00 IS CODE =  1
  UPSTREAM NODE  3005.00     ELEVATION =   537.24   (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          11.21 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =     272.57 FEET          MANNING'S N     0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT) =      0.94          CRITICAL DEPTH(FT) =      1.28
======================== ==================   ============ =================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.28

  GRADUALLY VARIED  FLOW  PROFILE  COMPUTED  INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT}          (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM( POUNDS)
          0.000         1.280       6.977          2.036          210.95
          0.032         1.266       7.042          2.037          210.98
```

0.130	1.252	7.109	2.038	211.09
0.300	1.239	7.180	2.040	211.28
0.547	1.225	7.253	2.042	211.54
0.877	1.211	7.329	2.046	211.88
1.300	1.198	7.408	2.050	212.30
1.825	1.184	7.490	2.056	212.80
2.462	1.170	7.576	2.062	213.39
3.226	1.157	7.664	2.069	214.06
4.132	1.143	7.757	2.078	214.82
5.200	1.129	7.852	2.087	215.68
6.454	1.116	7.952	2.098	216.62
7.924	1.102	8.055	2.110	217.67
9.648	1.088	8.162	2.123	218.81
11.675	1.074	8.273	2.138	220.06
14.070	1.061	8.388	2.154	221.41
16.919	1.047	8.507	2.172	222.88
20.347	1.033	8.631	2.191	224.45
24.534	1.020	8.760	2.212	226.15
29.758	1.006	8.894	2.235	227.97
36.490	0.992	9.033	2.260	229.92
45.608	0.979	9.177	2.287	232.01
59.088	0.965	9.327	2.317	234.23
83.272	0.951	9.483	2.348	236.59
272.570	0.949	9.505	2.353	236.94

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.13

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.129	6.344	2.754	289.89
57.635	1.500	6.344	2.125	220.51

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
57.635	1.500	6.342	2.125	220.51
58.329	1.491	6.346	2.117	219.64
58.930	1.482	6.355	2.110	218.87
59.476	1.474	6.367	2.103	218.15
59.981	1.465	6.380	2.097	217.47
60.451	1.456	6.396	2.092	216.85
60.891	1.447	6.413	2.086	216.26
61.302	1.438	6.431	2.081	215.70
61.688	1.430	6.451	2.076	215.18
62.050	1.421	6.473	2.072	214.69
62.389	1.412	6.496	2.068	214.24
62.706	1.403	6.520	2.064	213.81
63.001	1.394	6.545	2.060	213.42
63.276	1.386	6.571	2.056	213.06
63.530	1.377	6.599	2.053	212.72
63.764	1.368	6.628	2.050	212.41
63.977	1.359	6.658	2.048	212.14
64.169	1.350	6.689	2.045	211.89
64.340	1.341	6.721	2.043	211.67

```
        64.491          1.333       6.754          2.041          211.48
        64.620          1.324       6.789          2.040          211.32
        64.727          1.315       6.824          2.039          211.18
        64.812          1.306       6.861          2.038          211.08
        64.873          1.297       6.899          2.037          211.01
        64.910          1.289       6.937          2.036          210.96
        64.923          1.280       6.977          2.036          210.95
       272.570          1.280       6.977          2.036          210.95
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
1 PRESSURE+MOMENTUM BALANCE OCCURS AT     44.05 FEET UPSTREAM OF NODE 3555.00
       DOWNSTREAM DEPTH = 1.648 FEET, UPSTREAM CONJUGATE DEPTH = 0.950 FEET

  NODE   3005.00 : HGL = <  538.520>;EGL= <  539.276>;FLOWLINE= <  537.240>

**************************************************************.**. ******.
  FLOW PROCESS FROM NODE  3005.00 TO NODE  3005.00 IS CODE =  8
  UPSTREAM NODE  3005.00     ELEVATION =   537.24   (FLOW IS AT CRITICAL DEPTH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =      11.21 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY = 6.98 FEET/SEC .  VELOCITY HEAD =  0.756 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.756) =  0.151

  NODE   3005.00 : HGL = <  539.428>;EGL= <  539.428>;FLOWLINE= <  537.240>

****************************************.    ********************************k
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3005.00            FLOWLINE ELEVATION =   537.24
  ASSUMED UPSTREAM CONTROL HGL =    538.52 FOR DOWNSTREAM  RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

50-year calc 3022-3015

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
(Reference: LACFCD, LACRD, AND OCEMA HYDRAULICS CRITERION)
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Analysis prepared by:

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DESCRIPTION OF STUDY

* McMILLIN OTAY RANCH VILLAGE 7 J-14531A *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000 (NODE 3015 TO 3022 LATERAL) *
* 50-YR STORM EVENT, ULTIMATE CONDITION BY:PT *

FILE NAME: 3000G.PIP
TIME/DATE OF STUDY: 14:54 11/15/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
3015.00-		1.78*	113.60	0.27	6.14
	} FRICTION				
3022.00-		1.56*	89.46	0.32 De	5.89
	) CATCH BASIN				
3022.00-		1.56*	89.23	0.32 De	2.17

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 3015.00 FLOWLINE ELEVATION = 522.00
PIPE FLOW = 0.72 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 523.775 FEET

NODE 3015.00 : HGL = < 523.775>;EGL= < 523.778> ;FLOWLINE= < 522.000>

FLOW PROCESS FROM NODE 3015.00 TO NODE 3022.00 IS CODE = 1
UPSTREAM NOOE 3022.00 ELEVATION = 522.22 (FLOW IS UNDER PRESSURE)

CALCULATE FRICTION LOSSES (LACFCD):
PIPE FLOW 0.72 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH 22.25 FEET MANNING'S N 0.01300
SF=(Q/K)**2 ((0.72)/(105.435))**2 = 0.00005
HF=L*SF = (22.25)*(0.00005) = 0.001

NODE 3022.00 : HGL = < 523.776>;EGL= < 523.779>;FLOWLINE= < 522.220>

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**********************************************************************  ********
  FLOW PROCESS FROM NODE  3022.00 TO NODE  3022.00 IS CODE =  8
  UPSTREAM NODE  3022.00     ELEVATION =   522.22   (FLOW IS UNDER PRESSURE)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       0.72 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY  =  0.42 FEET/SEC.  VELOCITY HEAD =  0.003 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.003) =  0.001

  NODE  3022.00 : HGL = <  523.779>;EGL= <  523.779>;FLOWLINE= <  522.220>

************************************* ***************** ******************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3022.00            FLOWLINE ELEVATION =   522.22
  ASSUMED UPSTREAM CONTROL HGL =    522.54 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

50-year lateral

```
**************************************************************************
                PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
          (Reference: LACFCD, LACRD, AND OCEMA HYDRAULICS CRITERION)
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                        Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 rriars Road
                         San Diego, California 92110
                        619-291-0707    Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* McMILLIN OTAY RANCH VILLAGE 7                                  J-l4531A
 * PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000 (NODE 3015 TO 3019 LATERAL)  *
 * 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT   *
 ************************************************************************

  FILE NAME: 3000F.PIP
  TIME/DATE OF STUDY: 14:47 11/15/2004

**************************************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                     UPSTREAM RUN                  DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+        FLOW         PRESSURE+
  NUMBER  PROCESS   HEAD(FT)    MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
 3015.00-            1.78*          119.09          0.34            38.71
       1 FRICTION
 3016.00-            0.96*           39.98          0.58 De         26.49
       ) JUNCTION
 3016.00-            0.77"           19.51          0.16             8.46
       ) FRICTION        } HYDRAULIC JUMP
 3019.00-            0.30*Dc          5.17          0.30*Dc          5.17
       ) CATCH BASIN
 3019.00-            0.09             0.59          0.30*Dc          1.91

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY rLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3015.00          FLOWLINE ELEVATION =   522.00
  PIPE FLOW =       2.35 CFS      PIPE DIAMETER =  18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   523.775 FEET

  NODE  3015.00 : HGL = <  523.775>;EGL= <  523.802>;FLOWLINE= <  522.000>

********** ********************** ********** *************** *********** ****
  FLOW PROCESS FROM NODE  3015.00 TO NODE  3016.00 IS CODE =  1
  UPSTREAM NODE  3016.00     ELEVATION =   522.79  (FLOW SEALS IN REACH)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          2.35 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =     10.26 FEET          MANNING'S N     0.01300
==================================      ==; ===============================
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 DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =      1.78

 PRESSURE FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      PRESSURE    VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)       HEAD(FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
        0.000          1.775       1.330          1.802           119.09
        3.595          1.500       1.330          1.527            88.76

 NORMAL DEPTH(FT) =      0.29          CRITICAL DEPTH(FT) =      0.58

 ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =     1.50
 ========  ==========  ============================  ================  =======
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)         (FT)      (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
        3.595          1.500       1.329          1.527            88.76
        4.072          1.463       1.338          1.491            84.75
        4.544          1.426       1.354          1.455            80.81
        5.013          1.390       1.375          1.419            76.95
        5.480          1.353       1.400          1.383            73.18
        5.943          1.316       1.430          1.348            69.50
        6.405          1.279       1.463          1.312            65.92
        6.863          1.242       1.501          1.277            62.45
        7.318          1.206       1.543          1.243            59.10
        7.770          1.169       1.590          1.208            55.86
        8.217          1.132       1.642          1.174            52.76
        8.660          1.095       1.700          1.140            49.79
        9.098          1.058       1.763          1.107            46.96
        9.529          1.021       1.833          1.074            44.28
        9.953          0.985       1.910          1.041            41.75
       10.260          0.957       1.973          1.018            39.98

 NODE   3016.00 : HGL = <  523.747>;EGL= <  523.808>;FLOWLINE= <  522.790>

****************************************  "  ** *********************  *********
 FLOW PROCESS FROM NODE  3016.00 TO NODE  3016.00 IS CODE =  5
 UPSTREAM NODE  3016.00     ELEVATION =   523.12   (FLOW IS SUBCRITICAL)

 CALCULATE JUNCTION LOSSES:
      PIPE          FLOW     DIAMETER    ANGLE     FLOWLINE  CRITICAL     VELOCITY
                    (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)   (FT/SEC)
    UPSTREAM         0.65       18.00       0.00     523.12       0.30         0.712
   DOWNSTREAM        2.35       18.00                522.79       0.58         1.974
   LATERAL #1        0.00        0.00       0.00       0.00       0.00         0.000
   LATERAL #2        0.00        0.00       0.00       0.00       0.00         0.000
      Q5             1.70===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS(DELTA4))/(Al+A2)*16.l)+FRICTION LOSSES
 UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00014
 DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00092
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00053
 JUNCTION LENGTH      4.00 FEET
 FRICTION LOSSES     0.002 FEET          ENTRANCE LOSSES     0.012 FEET
 JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES    ( 0.077)+( 0.012) =    0.089
--------------  ----------------------------------------  ------------------
 NODE   3016.00 : HGL = <  523.889>;EGL= <  523.897>;FLOWLINE= <  523.120>
```

```
****************************************************************************
  FLOW PROCESS FROM NODE  3016.00 TO NODE  3019.00 IS CODE = 1
  UPSTREAM NODE  3019.00     ELEVATION =   523.99  (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          0.65 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =     10.75 FEET          MANNING'S N     0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT) =     0.15           CRITICAL DEPTH(FT) =      0.30

  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =      0.30

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)           (FT)    (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
          0.000          0.299      2.594          0.404            5.17
          0.003          0.293      2.668          0.404            5.18
          0.013          0.287      2.746          0.405            5.19
          0.030          0.282      2.828          0.406            5.21
          0.055          0.276      2.915          0.408            5.23
          0.090          0.270      3.006          0.410            5.27
          0.135          0.264      3.102          0.414            5.31
          0.192          0.258      3.204          0.418            5.37
          0.263          0.252      3.312          0.423            5.43
          0.349          0.246      3.426          0.429            5.50
          0.454          0.241      3.547          0.436            5.59
          0.580          0.235      3.675          0.445            5.68
          0.731          0.229      3.812          0.455            5.79
          0.911          0.223      3.958          0.466            5.91
          1.127          0.217      4.113          0.480            6.05
          1.386          0.211      4.280          0.496            6.20
          1.698          0.206      4.458          0.514            6.37
          2.078          0.200      4.649          0.536            6.56
          2.543          0.194      4.855          0.560            6.77
          3.124          0.188      5.077          0.588            7.00
          3.863          0.182      5.317          0.621            7.26
          4.835          0.176      5.576          0.659            7.54
          6.180          0.170      5.858          0.704            7.86
          8.210          0.165      6.165          0.755            8.21
         10.750          0.161      6.391          0.795            8.46

  HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS
============================================== ======================  =
  DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.77
================================== ============    ==========================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)           (FT)    (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
          0.000          0.769      0.713          0.777           19.51
          0.226          0.750      0.735          0.759           18.48
          0.451          0.731      0.759          0.740           17.49
          0.676          0.713      0.785          0.722           16.54
          0.900          0.694      0.813          0.704           15.62
          1.123          0.675      0.843          0.686           14.74
          1.345          0.656      0.874          0.668           13.89
          1.566          0.637      0.908          0.650           13.08
```

1.786	0.619	0.945	0.632	12.30
2.004	0.600	0.985	0.615	11.56
2.220	0.581	1.028	0.597	10.86
2.435	0.562	1.074	0.580	10.19
2.646	0.543	1.125	0.563	9.56
2.855	0.525	1.180	0.546	8.97
3.061	0.506	1.240	0.530	8.42
3.262	0.487	1.306	0.514	7.90
3.458	0.468	1.379	0.498	7.42
3.649	0.449	1.460	0.483	6.99
3.832	0.431	1.549	0.468	6.59
4.005	0.412	1.649	0.454	6.24
4.167	0.393	1.760	0.441	5.94
4.315	0.374	1.886	0.430	5.68
4.443	0.355	2.028	0.419	5.47
4.548	0.337	2.191	0.411	5.31
4.619	0.318	2.377	0.406	5.21
4.646	0.299	2.594	0.404	5.17
10.750	0.299	2.594	0.404	5.17

----------END OF HYDRAULIC JUMP ANALYSIS----------

1 PRESSURE+MOMENTUM BALANCE OCCURS AT 3.19 FEET UPSTREAM OF NODE 3016.00
DOWNSTREAM DEPTH = 0.494 FEET, UPSTREAM CONJUGATE DEPTH = 0.166 FEET

NODE 3019.00 : HGL = < 524.290>;EGL= < 524.395>;FLOWLINE= < 523.991>

****

FLOW PROCESS FROM NODE 3019.00 TO NODE 3019.00 IS CODE = 8
UPSTREAM NODE 3019.00 ELEVATION = 524.32 (FLOW IS SUBCRITICAL)
(NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 0.65 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 8.52 FEET/SEC. VELOCITY HEAD = 1.127 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(1.127) 0.225

NODE 3019.00 : HGL = < 524.620>;EGL= < 524.620>;FLOWLINE= < 524.321>

****

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 3019.00 FLOWLINE ELEVATION = 524.32
ASSUMED UPSTREAM CONTROL HGL = 524.62 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

50 year Local 3002 - 3003

****

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
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Ver. 8.0 Release Date: 01/01/2003 License ID 1261

Analysis prepared by:

RICK ENGINEERING COMPANY
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San Diego, California 92110
619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********
* McMILLIN OTAY RANCH VILLAGE 7 J-14531A *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000 (NODE 3003 TO 3002 LATERAL) *
* 50-YR STORM EVENT, ULTIMATE CONDITION BY:PT *
****

FILE NAME: 3000I.PIP
TIME/DATE OF STUDY: 15:07 11/15/2004

****

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	PRESSURE+ MOMENTUM (POUNDS)
3003.00	-} rnICTION	1.57*	123.09	0.63	93.17
3002.00	-) CATCH BASIN	1.09*	83.07	0.90 De	78.48
3002.00	-	1.38*	56.23	0.90 De	26.74

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

****

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 3003.00 FLOWLINE ELEVATION = 526.52
PIPE FLOW = 5.43 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 528.093 FEET

NODE 3003.00 : HGL = < 528.093>;EGL= < 528.240>;FLOWLINE= < 526.520>

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

FLOW PROCESS FROM NODE 3003.00 TO NODE 3002.00 IS CODE = 1
UPSTREAM NODE 3002.00 ELEVATION = 526.93 (FLOW SEALS IN REACH)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 5.43 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 8.25 FEET MANNING'S N = 0.01300

==========

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 1.57

==========

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

```
  DISTANCE FROM        PRESSURE    VELOCITY      SPECIFIC        PRESSURE+
   CONTROL (FT}       HEAD (FT}   (fT/SEC}     ENERGY(FT)     MOMENTUM(POUNDS)
          0.000          1.573       3.073          1.720           123.09
          1.552          1.500       3.073          1.647           115.04

  NORMAL DEPTH( FT) =      0.49          CRITICAL DEPTH( FT) =      0.90

  ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =     1.50
;========= ==============================  ================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL( FT)           (FT)    (FT/SEC)     ENERGY( FT)    MOMENTUM(POUNDS)
          1.552          1.500       3.072          1.647           115.04
          2.042          1.476       3.082          1.624           112.50
          2.512          1.452       3.102          1.601           110.06
          2.968          1.428       3.127          1.580           107.71
          3.414          1.404       3.157          1.559           105.43
          3.850          1.380       3.192          1.538           103.23
          4.276          1.356       3.231          1.518           101.10
          4.693          1.331       3.274          1.498            99.04
          5.100          1.307       3.321          1.479            97.06
          5.497          1.283       3.372          1.460            95.17
          5.884          1.259       3.427          1.442            93.35
          6.260          1.235       3.487          1.424            91.62
          6.623          1.211       3.551          1.407            89.97
          6.974          1.187       3.619          1.391            88.42
          7.311          1.163       3.693          1.375            86.96
          7.632          1.139       3.771          1.360            85.59
          7.937          1.115       3.854          1.346            84.34
          8.224          1.091       3.944          1.332            83.18
          8.250          1.088       3.953          1.331            83.07
--------------------------------------------------------------------------------
  NODE   3002.00 : HGL = <  528.018>;EGL= <  528.261>;FLOWLINE= <  526.930>

****** ****** **** ********** ************************************ ****** ******* *
  FLOW PROCESS FROM NODE  3002.00 TO NODE  3002.00 IS CODE =  8
  UPSTREAM NODE  3002.00     ELEVATION =   526.93   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       5.43 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY  =  3.96  FEET/SEC.    VELOCITY  HEAD  =  0.243 FEET
  CATCH BASIN ENERGY LOSS =  .2*(VELOCITY HEAD) =  .2*(  0.243) =  0.049

  NODE   3002.00 : HGL = <  528.310>;EGL= <  528.310>;FLOWLINE= <  526.930>

*********** *************** **** ******* k *********** *********** *************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3002.00            FLOWLINE ELEVATION =   526.93
  ASSUMED UPSTREAM CONTROL HGL =    527.83 FOR DOWNSTREAM RUN ANALYSIS

================= =;================================================
  END OF GRADUALLY VARIED FLOW ANALYSIS
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50-year event 3004-3003

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**********************************************************************  **************
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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707    Fax 619-291-4165

 ** ************************  DESCRIPTION OF STUDY  **************************
  * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A  *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000 (NODE 3003 TO 3004 LATERAL)  *
  * 50-YR STORM EVENT, ULTIMATE CONDITION                            BY:PT  *
 ************************************************************   *** ** *******

  FILE NAME: 3000R.PIP
  TIME/DATE OF STUDY: 15:11 11/15/2004

******** ******* ***************** *********** ***********************************
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                         NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                      UPSTREAM RUN                  DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+         FLOW         PRESSURE+
  NUMBER   PROCESS   HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
 3003.00-              1.57*          94.79          0.37             24.00
        ) FRICTION
 3004.00-              1.10*          47.56          0.52 De          20.46
        ) CATCH BASIN
 3004.00-              1.13*          44.07          0.52 De           7.39

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**************************************************************************    ***
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  3003.00          FLOWLINE ELEVATION =   526.52
 PIPE FLOW =       1.92 CFS      PIPE DIAMETER =  18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =  528.093 FEET

 NODE  3003.00 : HGL = <  528.093>;EGL= <  528.lll>;FLOWLINE= <  526.520>

******** ********* ***************************** ***** ********** *********.K ****
 FLOW PROCESS FROM NODE  3003.00 TO NODE  3004.00 IS CODE =  1
 UPSTREAM NODE  3004.00     ELEVATION =   526.99   (FLOW SEALS IN REACH)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          1.92 CFS      PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =      23.30 FEET          MANNING'S N     0.01300
==========================================================================
 DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     1.57
 ========================================================================  =;
 PRESSURE FLOW PROFILE COMPUTED INFORMATION:
```

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY (FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.573	1.086	1.591	94.79
3.680	1.500	1.086	1.518	86.75

NORMAL DEPTH(FT) = 0.36 CRITICAL DEPTH(FT) = 0.52

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
3.680	1.500	1.086	1.518	86.75
5.637	1.461	1.094	1.479	82.47
7.580	1.422	1.108	1.441	78.27
9.515	1.383	1.127	1.402	74.15
11.442	1.344	1.150	1.364	70.11
13.363	1.304	1.176	1.326	66.18
15.276	1.265	1.207	1.288	62.36
17.181	1.226	1.241	1.250	58.66
19.079	1.187	1.280	1.212	55.09
20.967	1.148	1.323	1.175	51.64
22.844	1.109	1.371	1.138	48.34
23.300	1.099	1.383	1.129	47.56

NODE 3004.00 : HGL = < 528.089>;EGL= < 528.119>;FLOWLINE= < 526.990>

FLOW PROCESS FROM NODE 3004.00 TO NODE 3004.00 IS CODE = 8
UPSTREAM NODE 3004.00 ELEVATION = 526.99 (FLOW IS SUBCRITICAL)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 1.92 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 1.38 FEET/SEC. VELOCITY HEAD = 0.030 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.030) = 0.006

NODE 3004.00 : HGL = < 528.125>;EGL= < 528.125>;FLOWLINE= < 526.990>

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 3004.00 FLOWLINE ELEVATION = 526.99
ASSUMED UPSTREAM CONTROL HGL = 527.51 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

60 year 3007 - 3013

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**    ****************************************************************************
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                       619-291-0707    Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY ************************ **
  * McMILLIN OTAY RANCH VILLAGE 7                                  J-1<1531A •
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000 (NODE 3007 TO 3013 LATERAL)   *
  * 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT *
  ************************************************************************      *

  FILE NAME: 3000W.PIP
  TIME/DATE OF STUDY: 13:19 11/15/2004

******** ******************* ************* ************************************
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                      UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL   PRESSURE       PRESSURE+          FLOW         PRESSURE+
  NUMBER   PROCESS  HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
  3007.00-              1.89*          239.52         0.95          171.76
         ) FRICTION
        3008.00-             1.33*          170.14        1.14 De          164.04
         ) JUNCTION
  3008.00-              1.41*          122.34         0.58             105.55
         ) FRICTION          ) HYDRAULIC JUMP
  3046.00-              0.87*Dc         83.99         0.87*Dc           84.00
         ) JUNCTION
  3046.00-              1.06            92.16         0.64*            110.80
         ) FRICTION
  3989.00-              0.95 De         90.55         0.64*            110.91
         ) FRICTION+BEND
  3989.00-              0.95 De         90.55         0.64*            111.01
         } FRICTION
  3989.00-              0.95 De         90.55         0.61*            116.58
         ) MANHOLE
  3989.00-              0.95 De         90.55         0.69*            104.15
         ) FRICTION
  3013.00-              0.95*Dc         90.55         0.95*Dc           90.55
         ) CATCH BASIN
  3013.00-              1.44*           51.51         0.95 De           30.44

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
************************* *****  ************************************"k *********
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER     3007.00          FLOWLINE ELEVATION =    525.19
  PIPE FLOW =       10.13 CFS      PIPE DIAMETER =  24.00 INCHES
```

```
 ASSUMED DOWNSTREAM CONTROL HGL =    527.081 FEET

 NODE   3007.00 : HGL = <  527.081>;EGL= <  527.250>;FLOWLINE= <  525.190>

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

 FLOW PROCESS FROM NODE  3007.00 TO NODE  3008.00 IS CODE =  1
 UPSTREAM NODE  3008.00     ELEVATION =   525.71   (FLOW IS SUBCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          10.13 CFS     PIPE DIAMETER =  24.00  INCHES
 PIPE LENGTH =      52.33 FEET          MANNING'S N 0.01300

 NORMAL DEPTH(FT) =      0.94           CRITICAL DEPTH( FT) =      1.14

 DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.89

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)           (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          1.891      3.293          2.060           239.52
         3.273          1.861      3.325          2.033           234.39
         6.493          1.831      3.360          2.006           229.40
         9.665          1.801      3.399          1.980           224.55
        12.791          1.771      3.442          1.955           219.84
        15.873          1.741      3.489          1.930           215.27
        18.910          1.711      3.540          1.905           210.85
        21.902          1.680      3.594          1.881           206.59
        24.847          1.650      3.652          1.858           202.48
        27.745          1.620      3.714          1.835           198.54
        30.590          1.590      3.781          1.812           194.78
        33.381          1.560      3.851          1.791           191.18
        36.112          1.530      3.927          1.770           187.78
        38.777          1.500      4.007          1.749           184.56
        41.369          1.470      4.092          1.730           181.53
        43.880          1.440      4.183          1.712           178.72
        46.299          1.410      4.279          1.694           176.11
        48.613          1.380      4.381          1.678           173.73
        50.807          1.350      4.490          1.663           171.58
        52.330          1.327      4.575          1.653           170.14

 NODE   3008.00 : HGL = <  527.037>;EGL= <  527.363>;FLOWLINE= <  525.710>

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

 FLOW PROCESS FROM NODE  3008.00 TO NODE  3008.00 IS CODE =  5
 UPSTREAM NODE  3008.00     ELEVATION =   526.04   (FLOW IS SUBCRITICAL)

 CALCULATE JUNCTION LOSSES:
      PIPE          FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                    (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)   (FT/SEC)
    UPSTREAM         6.05     24.00       0.00     526.04       0.87         2.552
   DOWNSTREAM       10.13     24.00                525.71       1.14         4.576
   LATERAL #1        1.88     18.00      67.00     526.54       0.52         2.305
   LATERAL #2        2.20     18.00      90.00     526.54       0.56         2.697
      Q5             0.00===Q5 EQUALS  BASIN  INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Ql*Vl*COS( DELTA1)-Q3*V3*COS( DELTA3)-
     Q4*V4*COS(DELTA4))/((Al+A2)*16.l}+FRICTION LOSSES
 UPSTREAM:     MANNING'S N    0.01300;   FRICTION SLOPE    0.00100
 DOWNSTREAM:   MANNING'S N = 0.01300;   FRICTION SLOPE = 0.00330
```

AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00215
JUNCTION LENGTH 4.00 FEET
FRICTION LOSSES 0.009 FEET ENTRANCE LOSSES 0.000 FEET
JUNCTION LOSSES (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES (0.191)+(0.000) = 0.191

NODE 3008.00 : HGL = < 527.452>;EGL= < 527.553>;FLOWLINE= < 526.040>

****

FLOW PROCESS FROM NODE 3008.00 TO NODE 3046.00 IS CODE = 1
UPSTREAM NODE 3046.00 ELEVATION = 528.50 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 6.05 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 105.06 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.57 CRITICAL DEPTH(FT) = 0.87

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.87

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.867	4.633	1.200	84.00
0.026	0.855	4.719	1.201	84.03
0.091	0.843	4.808	1.202	84.13
0.197	0.831	4.901	1.204	84.28
0.350	0.819	4.997	1.207	84.48
0.556	0.807	5.097	1.210	84.75
0.818	0.795	5.200	1.215	85.08
1.146	0.783	5.307	1.220	85.48
1.547	0.771	5.419	1.227	85.94
2.030	0.759	5.535	1.235	86.47
2.607	0.747	5.656	1.244	87.08
3.293	0.734	5.782	1.254	87.76
4.105	0.722	5.913	1.266	88.51
5.063	0.710	6.049	1.279	89.36
6.195	0.698	6.192	1.294	90.29
7.537	0.686	6.341	1.311	91.30
9.132	0.674	6.496	1.330	92.42
11.045	0.662	6.659	1.351	93.63
13.362	0.650	6.829	1.375	94.95
16.212	0.638	7.007	1.401	96.38
19.792	0.626	7.193	1.430	97.93
24.436	0.614	7.389	1.462	99.61
30.768	0.602	7.595	1.498	101.41
40.189	0.590	7.811	1.538	103.35
57.199	0.578	8.038	1.582	105.45
105.060	0.577	8.049	1.584	105.55

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

==========

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.41

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)

```
          0.000          1.412      2.551          1.513          122.34
          0.813          1.390      2.594          1.495          119.67
          1.618          1.369      2.640          1.477          117.08
          2.414          1.347      2.687          1.459          114.56
          3.200          1.325      2.737          1.442          112.12
          3.976          1.304      2.789          1.424          109.77
          4.740          1.282      2.843          1.408          107.50
          5.492          1.260      2.900          1.391          105.32
          6.231          1.239      2.960          1.375          103.23
          6.955          1.217      3.023          1.359          101.22
          7.663          1.195      3.088          1.343           99.31
          8.353          1.173      3.157          1.328           97.49
          9.023          1.152      3.229          1.314           95.78
          9.673          1.130      3.305          1.300           94.16
         10.298          1.108      3.384          1.286           92.65
         10.897          1.087      3.468          1.274           91.24
         11.467          1.065      3.556          1.262           89.94
         12.004          1.043      3.649          1.250           88.76
         12.504          1.022      3.747          1.240           87.70
         12.962          1.000      3.851          1.230           86.75
         13.374          0.978      3.960          1.222           85.94
         13.732          0.957      4.076          1.215           85.26
         14.030          0.935      4.198          1.209           84.72
         14.257          0.913      4.328          1.204           84.32
         14.404          0.892      4.466          1.201           84.08
         14.456          0.870      4.613          1.200           83.99
        105.060          0.870      4.613          1.200           83.99
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
 PRESSURE+MOMENTUM BALANCE OCCURS AT     5.42 FEET UPSTREAM OF NODE 3008.00
       DOWNSTREAM DEPTH = 1.262 FEET, UPSTREAM CONJUGATE DEPTH = 0.577 FEET

  NODE   3046.00 : HGL = <  529.367>;EGL= <  529.700>;FLOWLINE= <  528.500>

**********************************************************  ** * *** ***************
  FLOW PROCESS FROM NODE  3046.00 TO NODE  3046.00 IS CODE =  5
  UPSTREAM NODE  3046.00     ELEVATION =   529.00   (FLOW IS SUBCRITICAL)
  (NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW    DIAMETER    ANGLE     FLOWLINE   CRITICAL   VELOCITY
                   (CFS)   (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)  (FT/SEC)
     UPSTREAM       6.05     18.00     90.00     529.00       0.95        8.426
    DOWNSTREAM      6.05     24.00               528.50       0.87        4.614
    LATERAL   1     0.00      0.00      0.00       0.00       0.00        0.000
    LATERAL  #2     0.00      0.00      0.00       0.00       0.00        0.000
       Q5           O.OO===QS EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)  -Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4) )/( (Al+A2)*16.l)+FRICTION  LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02322
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00465
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01393
  JUNCTION LENGTH      4.00 FEET
  FRICTION LOSSES     0.056 FEET          ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 1.041)+( 0.000) =    1.041

  NODE   3046.00 : HGL = <  529.639>;EGL= <  530.742>;FLOWLINE= <  529.000>

**************************************************   ****** **** ***************
```

```
 FLOW PROCESS FROM NODE  3046.00 TO NODE  3989.00 IS CODE    1
 UPSTREAM NODE  3989.00     ELEVATION =   530.12  (FLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          6.05 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =     48.20 FEET          MANNING'S N     0.01300

 NORMAL DEPTH(FT) =      0.64          CRITICAL DEPTH(FT) =     0.95
=============================================================================== U
 PSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =      0.64
========================= =================================== =================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL( FT)          (FT)   (FT/SEC)    ENERGY( FT)   MOMENTUM(POUNDS)
        0.000          0.639      8.435         1.744           110.91
        1.115          0.639      8.434         1.744           110.90
        2.278          0.639      8.434         1.744           110.90
        3.492          0.639      8.433         1.744           110.89
        4.762          0.639      8.433         1.744           110.89
        6.094          0.639      8.432         1.743           110.88
        7.495          0.639      8.432         1.743           110.88
        B.971          0.639      8.431         1.743           110.8⁄
       10.531          0.639      8.430         1.743           110.87
       12.185          0.639      8.430         1.743           110.86
       13.947          0.639      B.429         1.743           110.86
       15.829          0.639      8.429         1.743           110.85
       17.851          0.639      8.428         1.743           110.85
       20.034          0.639      8.427         1.743           110.84
       22.407          0.639      8.427         1.742           110.84
       25.006          0.639      8.426         1.742           110.83
       27.879          0.639      8.426         1.742           ll0.83
       31.090          0.639      8.425         1.742           110.82
       34.730          0.639      8.425         1.742           110.82
       38.931          0.639      8.424         1.742           110.81
       43.900          0.639      8.423         1.742           110.80
       48.200          0.639      8.423         1.742           110.80
------------------------------------------     ------------------------------
 NODE  3989.00 : HGL = <  530.757>;EGL= <  531.862>;FLOWLINE= <  530.118>

* ** * ****** ********** ********* ********************  *************************
 FLOW PROCESS FROM NODE  3989.00 TO NODE  3989.00 IS CODE =  3
 UPSTREAM NODE  3989.00     ELEVATION =   530.58  (FLOW IS SUPERCRITICAL)

 CALCULATE  PIPE-BEND  LOSSES(OCEMA):
 PIPE FLOW =       6.05 CFS          PIPE DIAMETER    18.00 INCHES
 CENTRAL ANGLE =  5.795 DEGREES      MANNING'S N = 0.01300
 PIPE LENGTH =     19.72 FEET

 NORMAL DEPTH(FT) =      0.64          CRITICAL DEPTH(FT) =      0.95
================================  ======-============== ======== ===============
 UPSTREAM CONTROL ASSUMED FLOWDEPTH( FT) =     0.64

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL( FT)          (FT)   (FT/SEC)   ENERGY (FT)   MOMENTUM(POUNDS)
        0.000          0.638      8.446         1.746           111.01
        1.117          0.638      8.445         1.746           111.00
        2.281          0.638      8.444         1.746           110.99
        3.497          0.638      8.443         1.746           110.99
```

```
         4.770          0.638      8.442          1.746          110.98
         6.104          0.638      8.442          1.745          110.97
         7.506          0.638      8.441          1.745          110.96
         8.984          0.638      8.440          1.745          110.96
        10.546          0.638      8.439          1.745          110.95
        12.202          0.638      8.438          1.745          110.94
        13.965          0.638      8.437          1.745          110.93
        15.850          0.638      8.437          1.744          110.92
        17.874          0.639      8.436          1.744          110.92
        19.720          0.639      8.435          1.744          110.91

  NODE   3989.00 : HGL = <  531.214>;EGL= <  532.322>;FLOWLINE= <  530.576>

**************************    ************************************************
  FLOW PROCESS FROM NODE  3989.00 TO NODE  3989.00 IS CODE =  1
  UPSTREAM NODE  3989.00     ELEVATION =   536.05  (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW           6.05 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =     235.57 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      0.64           CRITICAL DEPTH(FT) =      0.95

  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =      0.61


-------------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM IPOUNDS)
        0.000          0.606      9.038          1.875          116.58
        1.253          0.608      9.012          1.869          116.33
        2.553          0.609      8.986          1.863          116.08
        3.905          0.610      8.960          1.858          115.83
        5.312          0.611      8.934          1.852          115.59
        6.782          0.613      8.909          1.846          115.35
        B.319          0.614      8.884          1.840          115.10
        9.932          0.615      8.858          1.835          114.86
       11.629          0.617      8.833          1.829          114.63
       13.420          0.618      8.808          1.824          114.39
       15.318          0.619      8.783          1.818          114.15
       17.337          0.621      8.759          1.813          113.92
       19.495          0.622      8.734          1.807          113.69
       21.815          0.623      8.710          1.802          113.46
       24.324          0.625      8.685          1.797          113.23
       27.059          0.626      8.661          1.792          113.01
       30.068          0.627      8.637          1.786          112.78
       33.415          0.629      8.613          1.781          112.56
       37.191          0.630      8.589          1.776          112.34
       41.528          0.631      8.566          1.771          112.12
       46.632          0.632      8.542          1.766          111.90
       52.848          0.634      8.519          1.761          111.68
       60.822          0.635      8.496          1.757          111.47
       72.006          0.636      8.472          1.752          111.25
       91.056          0.638      8.449          1.747          111.04
      235.570          0.638      8.446          1.746          111.01
------------------ ------------------------------------------------------------
  NODE   3989.00 : HGL = <  536.656>;EGL= <  537.925>;FLOWLINE= <  536.050>

****  ************************************************  ****** *** *** **********
  FLOW PROCESS FROM NODE  3989.00 TO NODE  3989.00 IS CODE = 2
  UPSTREAM NODE  3989.00     ELEVATION =   536.38  (FLOW IS SUPERCRITICAL}
```

```
 CALCULATE MANHOLE LOSSES(LACFCD):
 PIPE FLOW =       6.05 CFS            PIPE DIAMETER     18.00 INCHES
 AVERAGED VELOCITY HEAD =  1.091 FEET
 HMN = .05*(AVERAGED VELOCITY HEAD) = .05*( 1.091) =  0.055

 NODE  3989.00 : HGL = <  537.067>;EGL= <  537.980>;FLOWLINE= <  536.380>

****************************k**************************k*k*********
 FLOW PROCESS FROM NODE  3989.00 TO NODE  3013.00 IS CODE =  1
 UPSTREAM NODE  3013.00     ELEVATION =   542.80  (FLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW           6.05 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =     343.45 FEET          MANNING'S N     0.01300

 NORMAL DEPTH(FT) =      0.68           CRITICAL DEPTH(FT) =      0.95
===========================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.95

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM    FLOW DEPTH  VELOCITY      SPECIFIC       PRESSURE+
  CONTROL(FT)        (FT}     (FT/SEC}     ENERGY(FT}    MOMENTUM(POUNDS}
        0.000        0.950       5.125          1.358           90.55
        0.020        0.939       5.194          1.358           90.57
        0.081        0.928       5.266          1.359           90.62
        0.189        0.918       5.339          1.360           90.71
        0.347        0.907       5.415          1.362           90.84
        0.560        0.896       5.493          1.365           91.01
        0.836        0.885       5.574          1.368           91.22
        1.181        0.874       5.657          1.372           91.47
        1.604        0.863       5.743          1.376           91.76
        2.114        0.853       5.832          1.381           92.10
        2.724        0.842       5.924          1.387           92.48
        3.448        0.831       6.020          1.394           92.92
        4.303        0.820       6.118          1.402           93.40
        5.312        0.809       6.220          1.410           93.93
        6.502        0.798       6.325          1.420           94.51
        7.909        0.788       6.434          1.431           95.15
        9.580        0.777       6.547          1.443           95.85
       11.578        0.766       6.664          1.456           96.60
       13.994        0.755       6.786          1.471           97.42
       16.957        0.744       6.912          1.487           98.30
       20.670        0.733       7.043          1.504           99.25
       25.475        0.723       7.178          1.523          100.26
       32.008        0.712       7.319          1.544          101.35
       41.702        0.701       7.466          1.567          102.52
       59.156        0.690       7.618          1.592          103.76
      343.450        0.687       7.665          1.600          104.15
---------------------------------------------------------------------------
 NODE  3013.00 : HGL = <  543.750>;EGL= <  544.158>;FLOWLINE= <  542.800>

*********************************************************************k*
 FLOW PROCESS FROM NODE  3013.00 TO NODE  3013.00 IS CODE =  8
 UPSTREAM NODE  3013.00     ELEVATION =   542.80  {FLOW IS SUBCRITICAL)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       6.05 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =  5.13 FEET/SEC .  VELOCITY HEAD =  0.408 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.408) =  0.082
```

```
  NODE   3013.00  : HGL = <   544.240>;EGL= <   544.240>;FLOWLINE= <   542.800>

************** ********************************.*************************   ***
  UPSTREAM PIPE FLOW CONTROL DATA:
  NOOE NUMBER =   3013.00             FLOWLINE ELEVATION =    542.80
  ASSUMED UPSTREAM CONTROL HGL =     543.75 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

8-Jan 3012-3008

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

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619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********
* McMILLIN OTAY RANCH VILLAGE 7 J-14531A *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000 (NODE 3008 TO 3012 LATERAL) *
* 50-YR STORM EVENT, ULTIMATE CONDITION BY:PT *

FILE NAME: 3000U.PIP
TIME/DATE OF STUDY: 15:29 11/15/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
3008.00-		0.91*	39.45	0.52	31.58
	} FRICTION	) HYDRAULIC JUMP			
3012.00-		0.61*Dc	30.31	0.61*Dc	30.31
	} CATCH BASIN				
3012.00-		0.89*	16.22	0.61 De	10.84

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD, LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 3008.00 FLOWLINE ELEVATION = 526.54
PIPE FLOW = 2.61 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 527.452 FEET

NODE 3008.00 : HGL = < 527.452>;EGL= < 527.536>;FLOWLINE= < 526.540>

FLOW PROCESS FROM NODE 3008.00 TO NODE 3012.00 IS CODE = 1
UPSTREAM NODE 3012.00 ELEVATION = 526.74 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 2.61 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 20.21 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.51 CRITICAL DEPTH(FT) = 0.61

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.61

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY (FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.612	3.847	0.842	30.31
0.011	0.608	3.881	0.842	30.31
0.045	0.604	3.916	0.842	30.32
0.104	0.600	3.952	0.843	30.33
0.191	0.596	3.988	0.843	30.34
0.309	0.592	4.024	0.844	30.36
0.460	0.588	4.061	0.844	30.39
0.649	0.584	4.099	0.845	30.42
0.879	0.580	4.138	0.846	30.45
1.156	0.576	4.177	0.847	30.49
1.486	0.572	4.217	0.848	30.54
1.877	0.568	4.258	0.849	30.59
2.337	0.564	4.299	0.851	30.64
2.878	0.560	4.341	0.852	30.70
3.513	0.556	4.384	0.854	30.77
4.262	0.551	4.428	0.856	30.84
5.148	0.547	4.472	0.858	30.92
6.204	0.543	4.518	0.860	31.00
7.476	0.539	4.564	0.863	31.09
9.029	0.535	4.611	0.866	31.18
10.969	0.531	4.659	0.868	31.28
13.468	0.527	4.708	0.871	31.39
16.853	0.523	4.757	0.875	31.50
20.210	0.520	4.791	0.877	31.58

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.91

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH {FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY (fT)	PRESSURE+ MOMENTUM(POUND S)
0.000	0.912	2.320	0.996	39.45
1.088	0.900	2.357	0.986	38.80
2.167	0.888	2.395	0.977	38.17
3.236	0.876	2.434	0.968	37.56
4.294	0.864	2.475	0.959	36.97
5.340	0.852	2.518	0.951	36.41
6.372	0.840	2.562	0.942	35.86
7.391	0.828	2.608	0.934	35.34
8.395	0.816	2.655	0.926	34.83
9.382	0.804	2.705	0.918	34.36
10.350	0.792	2.756	0.910	33.90
11.297	0.780	2.809	0.903	33.47
12.222	0.768	2.865	0.896	33.06
13.122	0.756	2.922	0.889	32.68
13.994	0.744	2.982	0.882	32.32
14.835	0.732	3.045	0.876	31.99
15.640	0.720	3.110	0.871	31.69
16.406	0.708	3.178	0.865	31.41
17.126	0.696	3.249	0.860	31.16
17.793	0.684	3.324	0.856	30.94
18.400	0.672	3.401	0.852	30.75
18.937	0.660	3.482	0.849	30.60

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         19.391          0.648      3.567          0.846            30.47
         19.746          0.636      3.656          0.844            30.38
         19.980          0.624      3.749          0.843            30.33
         20.066          0.612      3.847          0.842            30.31
         20.210          0.612      3.847          0.842            30.31
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
 PRESSURE+MOMENTUM  BALANCE OCCURS AT    19.67 FEET UPSTREAM OF NODE 3008.00
       DOWNSTREAM DEPTH = 0.639 FEET, UPSTREAM CONJUGATE DEPTH = 0.586 FEET

  NODE   3012.00 : HGL = <  527.352>;EGL= <  527.582>;FLOWLINE= <  526.740>

************************************************************    ****************
  FLOW PROCESS FROM NODE  3012.00 TO NODE  3012.00 IS CODE =  8
  UPSTREAM NODE  3012.00     ELEVATION =   526.74   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       2.61 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY  =  3.85 FEET/SEC.  VELOCITY HEAD =  0.230 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.230) =  0.046

  NODE   3012.00 : HGL = <  527.628>;EGL= <  527.628>;FLOWLINE= <  526.740>

************************************    ******************  *************  * ****
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3012.00           FLOWLINE ELEVATION =   526.74
  ASSUMED UPSTREAM CONTROL HGL =    527.35 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
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@-Jan 3009 - 3008

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                          Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                            San Diego, California 92110
                          619-291-0707    Fax 619-291-4165

  ************************** DESCRIPTION OF STUDY **************************
   * McMILLIN OTAY RANCH VILLAGE 7                                 J-14531A *
   * PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000 (NODE 3008 TO 3009 LATERAL)  *
   * 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT *
  **************************************************************************

   FILE NAME: 3000H.PIP
   TIME/DATE OF STUDY: 15:17 11/15/2004

*********************************  ****************************************
                GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                  (Note: "*" indicates nodal point data used.)
                        UPSTREAM RUN                    DOWNSTRE.lM RUN
    NODE     MODEL    PRESSURE       PRESSURE+          FLOW          PRESSURE+
   NUMBER  PROCESS  HEAD(fT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOMENTUM(POUNDS)
  3008.00-              0.91*    36.20                  0.36              32.71
         } FRICTION          } HYDRAULIC JUMP
  3009.00-              0.56*Dc          24.63          0.56*Dc           24.63
         1 CATCH BASIN
  3009.00-              0.81*            13.14          0.56 De            8.86

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
*****************************************************************k     * ******
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3008.00           FLOWLINE ELEVATION =   526.54
  PIPE FLOW =       2.22 CFS       PIPE DIAMETER =  18.00  INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   527.452 FEET

  NODE  3008.00 : HGL = <  527.452>;EGL= <  527.513>;FLOWLINE= <  526.540>

*****************************************************************    ********
  FLOW PROCESS FROM NODE  3008.00 TO NODE  3009.00 IS CODE =  1
  UPSTREAM NODE  3009.00     ELEVATION =   527.09  (HYDRAULIC JUMP OCCURS}

  CALCULATE FRICTION LOSSES(LACFCD) :
  PIPE FLOW          2.22 CFS      PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =      11.07 FEET          MANNING'S N     0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT} =      0.31          CRITICAL DEPTH(FT) =      0.56
=== ========== =====================================================  ========
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UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.56

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.563	3.663	0.771	24.63
0.008	0.553	3.754	0.772	24.64
0.033	0.543	3.848	0.773	24.68
0.077	0.533	3.947	0.775	24.75
0.142	0.523	4.050	0.778	24.85
0.232	0.513	4.159	0.781	24.98
0.347	0.503	4.273	0.786	25.14
0.494	0.493	4.393	0.792	25.33
0.67<J	0.483	4.519	0.800	25.56
0.894	0.473	4.652	0.809	25.83
1.160	0.463	4.792	0.819	26.14
1.477	0.452	4.939	0.832	26.<J9
1.857	0.442	5.096	0.846	26.89
2.308	0.432	5.261	0.862	27.33
2.846	0.422	5.436	0.882	27.82
3.489	0.412	5.622	0.903	28.37
4.260	0.402	5.819	0.928	28.98
5.192	0.392	6.029	0.957	29.65
6.331	0.382	6.253	0.990	30.38
7.744	0.372	6.492	1.027	31.19
9.534	0.362	6.747	1.070	32.08
11.070	0.356	6.924	1.101	32.71

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.91

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.912	1.973	0.973	36.20
0.240	0.898	2.010	0.961	35.39
0.478	0.884	2.048	0.949	34.60
0.712	0.870	2.088	0.938	33.83
0.944	0.856	2.129	0.927	33.09
1.172	0.842	2.173	0.916	32.38
1.397	0.828	2.218	0.905	31.69
1.618	0.814	2.265	0.894	31.03
1.835	0.800	2.314	0.884	30.40
2.046	0.786	2.366	0.873	29.80
2.253	0.772	2.420	0.863	29.22
2.455	0.758	2.476	0.854	28.67
2.650	0.744	2.536	0.844	28.16
2.838	0.730	2.598	0.835	27.67
3.019	0.717	2.663	0.827	27.22
3.192	0.703	2.732	0.818	26.79
3.356	0.689	2.804	0.811	26.41
3.510	0.675	2.880	0.803	26.05
3.653	0.661	2.960	0.797	25.73
3.783	0.647	3.044	0.791	25.45
3.899	0.633	3.133	0.785	25.21
4.000	0.619	3.227	0.781	25.01
4.083	0.605	3.327	0.777	24.8q
4.146	0.591	3.432	0.774	24.73

```
          4.187          0.577       3.544          0.772            24.65
          4.201          0.563       3.663          0.771            24.63
         11.070          0.563       3.663          0.771            24.63
------------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
 PRESSURE+MOMENTUM BALANCE OCCURS AT     1.23 FEET UPSTREAM OF NODE 3008.00
 DOWNSTREAM DEPTH = 0.839 FEET, UPSTREAM CONJUGATE DEPTH = 0.361 FEET

  NODE   3009.00 : HGL = <  527.653>;EGL= <  527.861>;FLOWLINE= <  527.090>

******** *** ********************************************************  *** *********
  FLOW PROCESS FROM NODE  3009.00 TO NODE  3009.00 IS CODE =  8
  UPSTREAM NODE  3009.00     ELEVATION =   527.09   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       2.22 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =   3.67 FEET/SEC.    VELOCITY HEAD =  0.209 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.209) =  0.042

  NODE   3009.00 : HGL = <  527.903>;EGL= <  527.903>;FLOWLINE= <  527.090>

***************************************** ******************** ************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3009.00            FLOWLINE ELEVATION =   527.09
  ASSUMED UPSTREAM CONTROL HGL =    527.65 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

SYSTEM 11000

```
**********************************************************************  *** # *******
                PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
          (Reference: LACFCD,LACRD, AND OCEMA HYDRAULICS CRITERION)
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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                              San Diego, California 92110
                            619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
 * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A *
 * PRESSURE PIPE ANALYSIS AT BASIN 11000 (LATERAL NODE 11003 TO 11002)     *
 *                                                                         *
 * 50-YR STORM EVENT, ULTIMATE CONDITION                                   *
 ***************************************************************************

  FILE NAME: A:/110008.PIP
  TIME/DATE OF STUDY: 08:58 09/23/2004

**********************************************************************  **************
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                         NODAL POINT STATUS TABLE
                 (Note: "*" indicates nodal point data used.)
                       UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL    PRESSURE       PRESSURE+          FLOW          PRESSURE+
  NUMBER   PROCESS   HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOMENTUM(POUNDS)
  110.03-              0.46 De           15.31         0.28*         21.32
        | !:RICTION
  110.02-              0.46*Dc           15.31         0.46*De           15.31
        | CATCH BASIN
  111.02-              0.67*              B.13         0.46 De            5.57

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
************************ ****** *********** ********************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   110.03      1.53 CFS        FLOWLINE ELEVATION =   535.25
 PIPE FLOW =    REAfl        -IIGL           PIPE DIAMETER =  18.00 INCHES
--:xs=SUHEo DOWHS'P                          SJS-_690 FEET
                    CON'PROL-

 *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(   0.44 FT.)
        IS LESS THAN CRITICAL DEPTH(   0.46 FT.)
 ===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
      FOR UPSTREAM RUN ANALYSIS

 NODE    110.03 : HGL = <  535.532>;EGL= <  536.216>;FLOWLINE= <  535.250>

************************************************************** ***************
 FLOW PROCESS FROM NODE    110.03 TO NODE    110.02 IS CODE =  1
 UPSTREAM NODE   110.02     ELEVATION =   535.68   (FLOW IS SUPERCRITICAL}
```

```
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW            1.53 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =        4.25 FEET          MANNING'S N     0.01300

 NORMAL  DEPTH(FT) =      0.22           CRITICAL DEPTH (FT) "'·     0.46
========= ============ ============== ================-=: ================= =
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.46
========   ==========================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)           (FT)    (FT/SEC)     ENERGY( FT)    MOMENTUM(POUNDS)
         0.000          0.464      3.286          0.632            15.31
         0.004          0.454      3.385          0.632            15.33
         0.018          0.445      3.489          0.634            15.36
         0.042          0.435      3.599          0.636            15.42
         0.079          0.425      3.716          0.639            15.51
         0.128          0.415      3.839          0.644            15.63
         0.193          0.405      3.970          0.650            15.78
         0.276          0.395      4.109          0.658            15.96
         0.379          0.386      4.257          0.667            16.17
         0.505          0.376      4.415          0.679            16.42
         0.658          0.366      4.583          0.692            16.72
         0.843          0.356      4.763          0.709            17.05
         1.066          0.346      4.955          0.728            17.43
         1.333          0.336      5.162          0.750            17.85
         1.655          0.327      5.384          0.777            18.33
         2.043          0.317      5.624          0.808            18.87
         2.513          0.307      5.882          0.845            19.48
         3.087          0.297      6.162          0.887            20.15
         3.795          0.287      6.466          0.937            20.91
         4.250          0.282      6.632          0.966            21.32
-------------------------------------------------------------------------------
 NODE    110.02 : HGL = <  536.144>;EGL= <  536.312>;FLOWLINE= <  535.680>

*******************************************************************************
 FLOW PROCESS FROM NODE    110.02 TO NODE    111.02 IS CODE =  8
 UPSTREAM NODE    111. 02     ELEVATION =    535.68   (FLOW IS SUBCRITICAL)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =        1.53 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY  =   3.29  FEET/SEC .  VELOCITY HEAD  =  0.168 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.168) =  0.034

 NODE    111.02  : HGL = <  536.346>;EGL= <  536.346>;FLOWLINE= <  535.680>
-------------------------------------------------------------------------------
************************* *********  ****************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =    111.02             FLOWLINE ELEVATION =    535.68
 ASSUMED UPSTREAM CONTROL HGL =      536.14 fOR DOWNSTREAM RUN ANALYSIS

==========================================================  ==========  ======
 END OF GRADUALLY VARIED FLOW ANALYSIS
```

```
  NODE    110.04  : HGL = <  536.460>;EGL= <  536.7ll>;FLOWLINE= <  535.800>

****************************************************************************
  FLOW PROCESS FROM NODE   110.04 TO NODE    110.04 IS CODE =  8
  UPSTREAM NODE   110.04     ELEVATION =   535.80   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD);
  PIPE FLOW =       3.01 CFS         PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  4 .02 FEET/SEC .  VELOC ITY HEAD =  0.251 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.251) =  0.050

  NODE    110.04  : HGL = <  536.761>;EGL= <  536.76l>;FLOWLINE= <  535.800>

************************************ ****************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   110.04           FLOWLINE ELEVATION =  535.80
  ASSUMED UPSTREAM CONTROL HGL =    536.46 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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Analysis prepared by:

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San Diego, California 92110
619-291-0707 Fax 619-291-4165

DESCRIPTION OF STUDY

*** McMILLIN OTAY RANCH VILLAGE J-14531A ***
*** PRESSURE PIPE ANALYSIS AT BASIN 11000 ***
*** 50-YR STORM EVENT, ULTIMATE CONDITION BY:PT ***

FILE NAME: A:/11000.PIP
TIME/DATE OF STUDY: 08:49 09/23/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
110.07	FRICTION	2.00*	226.78	0.40	223.75
	HYDRAULIC JUMP				
110.06	JUNCTION	0.94 De	102.52	0.66*	121.93
110.06	FRICTION	0.95 De	102.52	0.77*	108.74
110.05	JUNCTION	0.94*Dc	102.52	0.94*Dc	102.52
110.05	FRICTION	1.09*	70.43	0.61	55.71
	HYDRAULIC JUMP				
110.03	JUNCTION	0.72*Dc	53.07	0.72*Dc	53.07
110.03	FRICTION	0.80	38.72	0.47*	42.47
110.04	CATCH BASIN	0.66*Dc	36.41	0.66*Dc	36.41
110.04		0.96*	19.56	0.66 De	12.95

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRO,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER 110.07 FLOWLINE ELEVATION = 517.79
PIPE FLOW = 7.06 CFS PIPE DIAMETER = 24.00 INCHES

ASSUMED DOWNSTREAM CONTROL **HGL** = 519.790 FEET

NODE 110.07 : **HGL** = < 519.790>;EGL= < 519.868>;FLOWLINE= < 517.790>

****

FLOW PROCESS FROM NODE 110.07 TO NODE 110.06 IS CODE = 1
UPSTREAM NODE 110.06 ELEVATION = 530.54 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 7.06 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 86.14 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.39 CRITICAL DEPTH(FT) = 0.94

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.66

GRADUALLY VARIED FLOW PROFILE COMPUTED. INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.662	7.775	1.601	121.93
0.258	0.651	7.957	1.635	123.81
0.541	0.640	8.147	1.671	125.80
0.853	0.629	8.346	1.711	127.93
1.197	0.618	8.553	1.754	130.19
1.577	0.607	8.770	1.802	132.60
1.998	0.596	8.997	1.853	135.15
2.463	0.584	9.235	1.910	137.87
2.980	0.573	9.484	1.971	140.76
3.556	0.562	9.746	2.038	143.83
4.198	0.551	10.020	2.111	147.10
4.918	0.540	10.309	2.191	150.57
5.729	0.529	10.613	2.279	154.26
6.647	0.518	10.933	2.375	158.19
7.691	0.507	11.270	2.480	162.37
8.888	0.496	11.626	2.596	166.82
10.273	0.485	12.003	2.723	171.56
11.893	0.474	12.402	2.863	176.61
13.813	0.463	12.824	3.018	182.01
16.131	0.452	13.273	3.189	187.77
18.995	0.441	13.749	3.378	193.93
22.659	0.429	14.256	3.587	200.53
27.595	0.418	14.797	3.821	207.60
34.862	0.407	15.375	4.080	215.18
47.869	0.396	15.993	4.370	223.33
86.140	0.396	16.025	4.386	223.75

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.00

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL (FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC E:NERGY(FT}	PRESSURE+ MOMENTUM(POUNDS)

```
          0.000          2.000          2.247          2.078          226.78
          0.282          1.958          2.258          2.037          218.67
          0.559          1.915          2.280          1.996          210.75
          0.833          1.873          2.308          1.956          203.02
          1.103          1.831          2.342          1.916          195.47
          1.371          1.789          2.381          1.877          188.12
          1.636          1.746          2.425          1.838          180.98
          1.898          1.704          2.475          1.799          174.05
          2.156          1.662          2.530          1.761          167.36
          2.411          1.619          2.590          1.724          160.91
          2.662          1.577          2.656          1.687          154.71
          2.909          1.535          2.728          1.651          148.78
          3.151          1.493          2.807          1.615          143.12
          3.387          1.450          2.893          1.580          137.76
          3.617          1.408          2.986          1.547          132.70
          3.840          1.366          3.088          1.514          127.96
          4.055          1.323          3.199          1.482          123.56
          4.260          1.281          3.320          1.452          119.50
          4.454          1.239          3.453          1.424          115.82
          4.634          1.197          3.598          1.398          112.52
          4.799          1.154          3.758          1.374          109.64
          4.946          1.112          3.933          1.352          107.19
          5.070          1.070          4.127          1.334          105.22
          5.167          1.027          4.341          1.320          103.75
          5.232          0.985          4.580          1.311          102.84
          5.255          0.943          4.845          1.308          102.52
         86.140          0.943          4.845          1.308          102.52
-------------------------END OF HYDRAULIC JUMP ANALYSIS-------------------------

 PRESSURE+MOMENTUM BALANCE OCCURS AT      0.11 FEET UPSTREAM OF NODE   110.07
       DOWNSTREAM DEPTH = 1.984 FEET, UPSTREAM CONJUGATE DEPTH = 0.396 FEET

  NODE    110.06 : HGL  =  <   531.202>;EGL=  <   532.141>;FLOWLINE=  <   530.540>

************************************ ************************************
  FLOW PROCESS FROM NODE    110.06 TO NODE    110.06 IS CODE =   5
  UPSTREAM NODE    110.06     ELEVATION =    530.87   (FLOW IS SUPERCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW    DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES)  (DEGREES) ELEVATION   DEPTH(FT.)  (FT/SEC)
     UPSTREAM        7.06     24.00       8.33     530.87       0.94        6.300
    DOWNSTREAM       7.06     24.00                530.54       0.94        7.777
    LATERAL #1       0.00      0.00       0.00       0.00       0.00        0.000
    LATERAL #2       0.00      0.00       0.00       0.00       0.00        0.000
       Q5            0.00===QS EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00973
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.01742
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01357
  JUNCTION LENGTH      4.00 FEET
  FRICTION LOSSES     0.054 FEET         ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 0.118)+(  0.000) =    0.118
```

NODE 110.06 : **HGL** = < 531.643>;EGL= < 532.259>;FLOWLINE= < 530.870>

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

FLOW PROCESS FROM NODE 110.06 TO NODE 110.05 IS CODE = 1
UPSTREAM NODE 110.05 ELEVATION = 533.48 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 7.06 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 261.50 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.77 CRITICAL DEPTH(FT) = 0.94

========== ==========

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.94

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.940	4.865	1.308	102.52
0.036	0.933	4.911	1.308	102.53
0.113	0.926	4.959	1.308	102.57
0.236	0.919	5.007	1.309	102.62
0.409	0.912	5.056	1.310	102.69
0.637	0.906	5.107	1.311	102.78
0.925	0.899	5.158	1.312	102.89
1.281	0.892	5.210	1.313	103.02
1.713	0.885	5.263	1.315	103.17
2.229	0.878	5.317	1.317	103.34
2.841	0.871	5.373	1.320	103.53
3.563	0.864	5.429	1.322	103.74
4.410	0.857	5.487	1.325	103.97
5.404	0.850	5.546	1.328	104.23
6.570	0.843	5.606	1.332	104.50
7.942	0.837	5.667	1.336	104.80
9.562	0.830	5.729	1.340	105.12
11.491	0.823	5.793	1.344	105.47
13.811	0.816	5.858	1.349	105.84
16.644	0.809	5.925	1.354	106.24
20.179	0.802	5.993	1.360	106.66
24.731	0.795	6.063	1.366	107.11
30.893	0.788	6.134	1.373	107.58
39.996	0.781	6.206	1.380	108.08
56.309	0.775	6.280	1.387	108.61
261.500	0.773	6.298	1.389	108.74

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NODE 110.05 : **HGL** = < 534.420>;EGL= < 534.788>;FLOWLINE= < 533.480>

********** *****+ ******* **********

FLOW PROCESS FROM NODE 110.05 TO NODE 110.05 IS CODE = 5
UPSTREAM NODE 110.05 ELEVATION = 533.81 (FLOW IS SUBCRITICAL)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	4.23	24.00	90.00	533.81	0.72	2.427
DOWNSTREAM	7.06	24.00		533.48	0.94	4.847
LATERAL #1	2.83	18.00	0.00	534.31	0.64	3.946

```
   LATERAL #2      0.00     0.00      0.00      0.00      0.00        0.000
      Q5           O.OO===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)  -
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00106
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00477
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00291
  JUNCTION LENGTH      4.00 FEET
  FRICTION LOSSES     0.012 FEET         ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+{ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 0.200)+{ 0.000) =    0.200

  NODE    110.05 : HGL = <  534.896>;EGL= <  534.988>;FLOWLINE= <  533.810>

************  ******  ********  Y  ***************  ***********************************
  FLOW PROCESS FROM NODE    110.05 TO NODE    110.03 IS CODE =  1
  UPSTREAM NODE    110.03     ELEVATION =    534.72   (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW            4.23 CFS      PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =      100.50 FEET           MANNING'S N      0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT) =       0.60            CRITICAL DEPTH(FT) =       0.72

  UPSTREAM CONTROL ASSUMED FLOWDEPTH{FT) =      0.72
========  ========================  ====================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH   VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM( POUNDS)
         0.000          0.722      4.138          0.988           53.07
         0.014          0.717      4.175          0.988           53.07
         0.058          0.712      4.214          0.988           53.08
         0.135          0.707      4.253          0.989           53.11
         0.247          0.703      4.293          0.989           53.13
         0.398          0.698      4.334          0.990           53.17
         0.593          0.693      4.375          0.990           53.22
         0.837          0.688      4.417          0.991           53.27
         1.133          0.683      4.460          0.992           53.33
         1.491          0.678      4.504          0.994           53.41
         1.916          0.674      4.548          0.995           53.49
         2.420          0.669      4.593          0.997           53.58
         3.013          0.664      4.639          0.998           53.68
         3.710          0.659      4.686          1.000           53.79
         4.530          0.654      4.733          1.002           53.91
         5.495          0.649      4.782          1.005           54.04
         6.637          0.645      4.831          1.007           54.18
         7.998          0.640      4.882          1.010           54.33
         9.637          0.635      4.933          1.013           54.49
        11.639          0.630      4.985          1.016           54.66
        14.139          0.625      5.039          1.020           54.84
        17.360          0.620      5.093          1.023           55.04
        21.721          0.616      5.149          1.027           55.24
```

28.165	0.611	5.205	1.032	55.46
39.718	0.606	5.263	1.036	55.69
100.500	0.605	5.268	1.037	55.71

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.09

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.086	2.425	1.178	70.43
1.437	1.072	2.467	1.166	69.19
2.862	1.057	2.509	1.155	68.00
4.274	1.043	2.553	1.144	66.84
5.672	1.028	2.599	1.133	65.72
7.054	1.014	2.646	1.122	64.64
8.420	0.999	2.696	1.112	63.60
9.768	0.984	2.747	1.102	62.61
11.095	0.970	2.800	1.092	61.66
12.401	0.955	2.855	1.082	60.75
13.682	0.941	2.912	1.072	59.88
14.937	0.926	2.971	1.063	59.06
16.163	0.912	3.033	1.054	58.29
17.355	0.897	3.098	1.046	57.56
18.511	0.882	3.165	1.038	56.88
19.626	0.868	3.235	1.030	56.26
20.695	0.853	3.308	1.023	55.68
21.711	0.839	3.384	1.017	55.16
22.667	0.824	3.464	1.010	54.69
23.555	0.809	3.547	1.005	54.27
24.363	0.795	3.635	1.000	53.91
25.078	0.780	3.726	0.996	53.62
25.683	0.766	3.821	0.993	53.38
26.156	0.751	3.922	0.990	53.21
26.470	0.737	4.027	0.989	53.10
26.585	0.722	4.138	0.988	53.07
100.500	0.722	4.138	0.988	53.07

----------END OF HYDRAULIC JUMP ANALYSIS----------

1 PRESSURE+MOMENTUM BALANCE OCCURS AT 20.65 FEET UPSTREAM OF NODE 110.05 I
1 DOWNSTREAM DEPTH = 0.854 FEET, UPSTREAM CONJUGATE DEPTH = 0.606 FEET I

NODE 110.03 : **HGL** = < 535.442>;EGL= < 535..708>;FLOWLINE= < 534.720>

****

FLOW PROCESS FROM NODE 110.03 TO NODE 110.03 IS CODE = 5
UPSTREAM NODE 110.03 ELEVATION = 535.22 (FLOW IS SUBCRITICAL)
(NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH (FT.)	VELOCITY (FT/SEC)
UPSTREAM	3.01	18.00	90.00	535.22	0.66	6.275
DOWNSTREAM	4.23	24.00		534.72	0.72	4.139
LATERAL #1	1.22	18.00	90.00	535.22	0.41	3.083
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000

```
      Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS( DELTA1)-Q3*V3*COS(DELTA3) -
      Q4*V4*COS (DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.01747
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00450
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01099
  JUNCTION LENGTH      4.00 FEET
  FRICTION LOSSES     0.044 FEET         ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (0Y+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 0.598)+( 0.000) =    0.598

  NODE    110.03 : HGL = <  535.694>;EGL= <  536.306>;FLOWLINE= <  535.220>

 ****************************************************************************
  FLOW PROCESS FROM NODE    110.3  TO NODE    110.4  IS CODE =  1
  UPSTREAM NODE    110.04     ELEVATION =    535.80  (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW           3.01 CFS      PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =       29.27 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =       0.46           CRITICAL DEPTH(FT) =       0.66
===== ========================================== ======== ====================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =      0.66
============================ =====  ==================== ============ ======= =
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
------------------- -----------------    ------------------------------------
  DISTANCE FROM       FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          0.660      4.021          0.911           36.41
         0.013          0.652      4.086          0.911           36.42
         0.054          0.644      4.154          0.912           36.45
         0.126          0.636      4.223          0.913           36.49
         0.231          0.628      4.295          0.914           36.56
         0.374          0.619      4.369          0.916           36.64
         0.559          0.611      4.445          0.918           36.74
         0.789          0.603      4.524          0.921           36.87
         1.073          0.595      4.605          0.925           37.01
         1.415          0.587      4.690          0.929           37.18
         1.824          0.579      4.777          0.934           37.37
         2.310          0.571      4.868          0.940           37.59
         2.885          0.563      4.961          0.946           37.83
         3.563          0.555      5.058          0.953           38.09
         4.365          0.547      5.159          0.961           38.39
         5.313          0.539      5.263          0.970           38.71
         6.439          0.531      5.371          0.980           39.06
         7.787          0.523      5.484          0.991           39.43
         9.418          0.515      5.601          1.003           39.84
        11.420          0.507      5.722          1.016           40.29
        13.931          0.499      5.849          1.031           40.76
        17.181          0.491      5.980          1.047           41.28
        21.603          0.483      6.117          1.065           41.83
        28.169          0.475      6.260          1.084           42.42
        29.270          0.474      6.273          1.086           42.47
--------------    ------------------------------------------------------------
```

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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* McMILLIN OTAY RANCH VILLAGE 7 J-14531A *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 11000 (NODE 11005 TO 11013 LATERAL) *
* 50-YR STORM EVENT, ULTIMATE CONDITION BY:PT *

FILE NAME: A:/llOOOC.PIP
TIME/DATE OF STUDY: 09:11 09/23/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM.
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
110.05-		0.61*	13.07	0.23	10.20
	} FRICTION		} HYDRAULIC JUMP		
110.13-		0.35*Dc	7.81	0.35*Dc	7.81
	J CATCH BASIN				
110.13-		0.50*	4.13	0.35 De	2.87

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 110.05 FLOWLINE ELEVATION = 534.29
PIPE FLOW = 0.90 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 534.900 FEET

NODE 110.05 : HGL = < 534.900>;EGL= < 534.928>;FLOWLINE= < 534.290>

FLOW PROCESS FROM NODE 110.05 TO NODE 110.13 IS CODE = 1
UPSTREAM NODE 110.13 ELEVATION = 537.24 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 0.90 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 95.18 FE·ET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.23 CRITICAL DEPTH(FT) = 0.35

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.35

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.353	2.833	0.478	7.81
0.006	0.348	2.893	0.478	7.81
0.024	0.343	2.954	0.479	7.82
0.055	0.338	3.018	0.479	7.84
0.102	0.333	3.084	0.481	7.86
0.165	0.328	3.153	0.482	7.88
0.247	0.323	3.225	0.484	7.92
0.350	0.317	3.299	0.487	7.96
0.476	0.312	3.377	0.489	8.01
0.629	0.307	3.458	0.493	8.07
0.812	0.302	3.542	0.497	8.13
1.031	0.297	3.630	0.502	8.20
1.290	0.292	3.721	0.507	8.29
1.596	0.287	3.817	0.513	8.38
1.959	0.282	3.917	0.520	8.48
2.390	0.276	4.022	0.528	8.59
2.903	0.271	4.132	0.537	8.71
3.519	0.266	4.247	0.546	8.84
4.266	0.261	4.367	0.557	8.98
5.185	0.256	4.494	0.570	9.14
6.342	0.251	4.627	0.583	9.31
7.844	0.246	4.767	0.599	9.49
9.894	0.241	4.915	0.616	9.69
12.947	0.235	5.071	0.635	9.90
18.463	0.230	5.235	0.656	10.13
95.180	0.229	5.278	0.662	10.20

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.61

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.610	1.333	0.638	13.07
0.296	0.600	1.364	0.629	12.70
0.590	0.590	1.396	0.620	12.34
0.881	0.579	1.429	0.611	11.99
1.169	0.569	1.464	0.602	11.65
1.453	0.559	1.500	0.594	11.32
1.734	0.548	1.538	0.585	11.01
2.012	0.538	1.578	0.577	10.71
2.285	0.528	1.620	0.569	10.42
2.553	0.518	1.664	0.561	10.15
2.816	0.507	1.710	0.553	9.89
3.073	0.497	1.759	0.545	9.64

```
          3.324          0.487          1.810          0.538          9.40
          3.568          0.477          1.864          0.531          9.19
          3.803          0.466          1.921          0.524          8.98
          4.030          0.456          1.981          0.517          8.79
          4.246          0.446          2.045          0.511          8.61
          4.450          0.435          2.112          0.505          8.45
          4.642          0.425          2.184          0.499          8.31
          4.819          0.415          2.259          0.494          8.18
          4.978          0.405          2.340          0.490          8.07
          5.118          0.394          2.426          0.486          7.98
          5.235          0.384          2.518          0.483          7.91
          5.325          0.374          2.616          0.480          7.85
          5.383          0.364          2.721          0.479          7.82
          5.404          0.353          2.833          0.478          7.81
         95.180          0.353          2.833          0.478          7.81
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
| PRESSURE+MOMENTUM BALANCE OCCURS AT      2.51 FEET UPSTREAM OF NODE   110.05 |
        DOWNSTREAM DEPTH = 0.519 FEET, UPSTREAM CONJUGATE DEPTH = 0.229 FEET |

 NODE    110.13 : HGL = <  537.593>;EGL=<  537.718>;FLOWLINE= <  537.240>

 ****************************************************************************
  FLOW PROCESS FROM NODE    110.13 TO NODE    110.13 IS CODE =  8
  UPSTREAM NODE    110.13     ELEVATION =   537.24   (FLOW IS SUBCRITICAL}

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD}:
  PIPE FLOW =        0.90 CFS           PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =   2.84  FEET/SEC.  VELOCITY HEAD =  0.125 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.125) =  0.025

  NODE    110.13 : HGL = <  537.743>;EGL= <  537.743>;FLOWLINE= <  537.240>

 ****************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    ll0.13            FLOWLINE ELEVATION =    537.24
  ASSUMED UPSTREAM CONTROL HGL =     537.59 FOR DOWNSTREAM RUN ANALYSIS

==========================================================================
  END OF GRADUALLY VARIED FLOW ANALYSIS
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SYSTEM 12000

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                              Analysis prepared by:

                            Rick Engineering Company
                                5620 Friars Road
                              San Diego, CA  92110
                                (619) 291-0707

 ************************** DESCRIPTION OF STUDY **********************************
  * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A     *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12099 TO 7002 MAIN)        *
* 50-YR STORM EVENT, ULTIMATE CONDITION                                BY:PT     *
 ************************************************************************

  FILE NAME: A:/12000CP.PIP
  TIME/DATE OF STUDY: 16:18 09/27/2004

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

              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                     UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+          FLOW         PRESSURE+
  NUMBER   PROCESS   HEAD(FT}    MOMENTUM(POUNDS}    DEPTH(FT)   MOMENTUM(POUNDS)
  120.99-              3.50*          2312.15          2.28           2241.16
        } FRICTION          } HYDRAULIC JUMP
  120.60-              2.78*Dc        2125.57          2.78*Dc        2125.57
        ) JUNCTION
  120.60-              4.61*          2128.66          1.47           1176.38
        } FRICTION          } HYDRAULIC JUMP
  120.87-              2.09 De         995.01          1.53*          1137.97
        } MANHOLE
  120.87-              2.09 De         995.01          1.66*          1073.75
        ) FRICTION
  120.88-              2.09*De         995.01          2.09*Dc         995.02
        } JUNCTION
  120.88-              2.91*           788.82          1.35            608.33
        } FRICTION          ) HYDRAULIC JUMP
  7002.00-              l.76*De         552.60         l.76*Dc         552.60
        } CATCH BASIN
  7002.00-             2.73*           453.85          1.76 De         179.46

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**.*************************************************************      ******

  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER      120.99          FLOWLINE ELEVATION =    522.19
  PIPE FLOW =       79.14 CFS      PIPE DIAMETER =  42.00 INCHES
```

ASSUMED DOWNSTREAM CONTROL **HGL** = 525.690 FEET

NODE 120.99 : **HGL** = < 525.690>;EGL= < 526.74l>;FLOWLINE= < 522.190>

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

FLOW PROCESS FROM NODE 120.99 TO NODE 120.60 IS CODE = 1
UPSTREAM NODE 120.60 ELEVATION = 524.05 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 79.14 CFS PIPE DIAMETER = 42.00 INCHES
PIPE LENGTH = 164.98 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 2.24 CRITICAL DEPTH(FT) = 2.78

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 2.78

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL{FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY{FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.780	9.654	4.228	2125.57
0.078	2.759	9.727	4.228	2125.76
0.321	2.737	9.801	4.230	2126.31
0.743	2.715	9.878	4.231	2127.25
1.359	2.694	9.956	4.234	2128.57
2.189	2.672	10.037	4.238	2130.29
3.252	2.651	10.119	4.242	2132.41
4.576	2.629	10.204	4.247	2134.93
6.188	2.608	10.290	4.253	2137.88
8.124	2.586	10.379	4.260	2141.24
10.425	2.565	10.470	4.268	2145.04
13.141	2.543	10.564	4.277	2149.29
16.335	2.522	10.660	4.287	2153.98
20.082	2.500	10.758	4.299	2159.14
24.479	2.479	10.859	4.311	2164.77
29.652	2.457	10.962	4.324	2170.88
35.763	2.436	11.068	4.339	2177.49
43.036	2.414	11.176	4.355	2184.60
51.782	2.393	11.288	4.373	2192.23
62.458	2.371	11.402	4.391	2200.39
75.773	2.350	11.519	4.412	2209.09
92.915	2.328	11.639	4.433	2218.35
116.110	2.307	11.762	4.457	2228.18
150.362	2.285	11.889	4.482	2238.59
164.980	2.280	11.919	4.488	2241.16

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 3.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIE'IC ENER;GY (FT)	PRESSURE+ MOMENTUM{POUNDS)
0.000	3.500	8.223	4.551	2312.15

4.890	3.471	8.233	4.525	2296.46
9.151	3.442	8.253	4.501	2282.13
13.066	3.414	8.277	4.478	2268.71
16.721	3.385	8.306	4.457	2256.06
20.160	3.356	8.340	4.437	2244.08
23.412	3.327	8.377	4.417	2232.75
26.495	3.298	8.417	4.399	2222.02
29.423	3.270	8.461	4.382	2211.87
32.204	3.241	8.508	4.365	2202.28
34.845	3.212	8.557	4.350	2193.26
37.349	3.183	8.610	4.335	2184.78
39.718	3.154	8.666	4.321	2176.86
41.952	3.126	8.724	4.308	2169.49
44.052	3.097	8.786	4.296	2162.66
46.013	3.068	8.850	4.285	2156.39
47.833	3.039	8.917	4.275	2150.67
49.507	3.010	8.987	4.265	2145.52
51.028	2.982	9.060	4.257	2140.94
52.389	2.953	9.135	4.250	2136.93
53.580	2.924	9.214	4.243	2133.51
54.591	2.895	9.296	4.238	2130.69
55.408	2.866	9.381	4.234	2128.47
56.016	2.838	9.469	4.231	2126.87
56.396	2.809	9.560	4.229	2125.90
56.529	2.780	9.654	4.228	2125.57
164.980	2.780	9.654	4.228	2125.57

----------END OF HYDRAULIC JUMP ANALYSIS----------

1 PRESSURE+MOMENTUM BALANCE OCCURS AT 22.42 FEET UPSTREAM OF NODE 120.99 I
DOWNSTREAM DEPTH = 3.336 FEET, UPSTREAM CONJUGATE DEPTH = 2.290 FEET I

NODE 120.60 : **HGL** = < 526.830>;EGL= < 528.278>;FLOWLINE= < 524.050>

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

FLOW PROCESS FROM NODE 120.60 TO NODE 120.60 IS CODE = 5
UPSTREAM NODE 120.60 ELEVATION = 524.38 (FLOW IS AT CRITICAL DEPTH)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	45.09	42.00	89.00	524.38	2.09	4.687
DOWNSTREAM	79.14	42.00		524.05	2.78	9.657
LATERAL #1	26.46	30.00	0.00	524.38	1.75	5.390
LATERAL #2	7.59	18.00	86.00	525.38	1.07	4.295
QS	0.00	===Q5 EQUALS BASIN INPUT===				

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY= (Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00201
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.00657
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00429
JUNCTION LENGTH 4.00 FEET
FRICTION LOSSES 0.017 FEET ENTRANCE LOSSES 0.000 FEET
JUNCTION LOSSES (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES (1.056)+(0.000) = 1.056

NODE 120.60 : **HGL** = < 528.994>;EGL= < 529.335>;FLOWLINE= < 524.380>

```
******   ***************************************************  ****************
  FLOW PROCESS FROM NODE    120.60 TO NODE    120.87 IS CODE =  1
  UPSTREAM NODE   120.87     ELEVATION =    528.01   (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          45.09 CFS     PIPE DIAMETER =  42.00 INCHES
  PIPE LENGTH =     242.14 FEET          MANNING'S N     0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT) =      1.47           CRITICAL DEPTH(FT) =      2.09
======== ==== ========== ======= ======== = ================;======
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.53
====================       ==========================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          1.528     11.169          3.466          1137.97
         2.862          1.525     11.194          3.472          1139.45
         5.860          1.523     11.218          3.478          1140.95
         9.008          1.520     11.242          3.484          1142.45
        12.318          1.518     11.267          3.490          1143.97
        15.808          1.515     11.292          3.496          1145.49
        19.495          1.513     11.316          3.503          1147.03
        23.400          1.510     11.341          3.509          1148.57
        27.549          1.508     11.366          3.515          1150.13
        31.972          1.505     11.391          3.521          1151.69
        36.703          1.503     11.416          3.528          1153.27
        41.786          1.500     11.441          3.534          1154.86
        47.272          1.498     11.467          3.541          1156.46
        53.226          1.495     11.492          3.547          1158.07
        59.730          1.493     11.518          3.554          1159.69
        66.888          1.490     11.543          3.561          1161.32
        74.80           1.488     11.569          3.567          1162.96
        83.772          1.485     11.595          3.574          1164.61
        93.946          1.483     11.621          3.581          1166.27
       105.748          1.480     11.647          3.588          1167.95
       119.773          1.478     11.674          3.595          1169.63
       137.020          1.475     11.700          3.602          1171.33
       159.361          1.473     11.726          3.609          1173.04
       191.005          1.470     11.753          3.616          1174.76
       242.140          1.468     11.778          3.623          1176.38

  HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS
====== ============================== ====================================
  DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =      4.61
=====   ======================================================================
  PRESSURE FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       PRESSURE   VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)        HEAD(FT)   (FT/SEC)     ENERGY(FT)    MOMENTOM(POUNDS)
         0.000          4.614      4.687          4.955          2128.66
        85.770          3.500      4.687          3.841          1460.14
============= ======== ========== ========= ====== ====== ====   =======
  ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =      3.50
```

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
85.770	3.500	4.685	3.841	1460.14
89.888	3.444	4.701	3.787	1427.83
93.818	3.388	4.731	3.735	1396.87
97.636	3.331	4.770	3.685	1366.94
101.360	3.275	4.816	3.635	1337.96
105.003	3.219	4.869	3.587	1309.92
108.567	3.163	4.928	3.540	1282.81
112.057	3.106	4.994	3.494	1256.67
115.470	3.050	5.066	3.449	1231.50
118.807	2.994	5.144	3.405	1207.33
122.064	2.938	5.229	3.362	1184.21
125.236	2.881	5.319	3.321	1162.16
128.318	2.825	5.417	3.281	1141.23
131.302	2.769	5.522	3.243	1121.45
134.181	2.713	5.634	3.206	1102.87
136.944	2.656	5.753	3.171	1085.54
139.577	2.600	5.881	3.138	1069.51
142.068	2.544	6.018	3.106	1054.84
144.397	2.488	6.163	3.078	1041.59
146.543	2.431	6.319	3.052	1029.83
148.482	2.375	6.485	3.029	1019.62
150.181	2.319	6.662	3.008	1011.05
151.604	2.263	6.852	2.992	1004.20
152.703	2.206	7.055	2.980	999.18
153.419	2.150	7.272	2.972	996.07
153.678	2.094	7.505	2.969	995.01
242.140	2.094	7.505	2.969	995.01

END OF HYDRAULIC JUMP ANALYSIS

PRESSURE+MOMENTUM BALANCE OCCURS AT 124.19 FEET UPSTREAM OF NODE 120.60

DOWNSTREAM DEPTH = 2.900 FEET, UPSTREAM CONJUGATE DEPTH = 1.478 FEET

NODE 120.87 : **HGL** = < 529.538>;EGL= < 531.476>;FLOWLINE= < 528.010>

****

FLOW PROCESS FROM NODE 120.87 TO NODE 120.87 IS CODE = 2
UPSTREAM NOOE 120.87 ELEVATION = 528.34 (FLOW IS SUPERCRITICAL)

CALCULATE MANHOLE LOSSES(LACFCD}:
PIPE FLOW = 45.09 CFS PIPE DIAMETER 42.00 INCHES
AVERAGED VELOCITY HEAD = 1.752 FEET
HMN = .05*(AVERAGED VELOCITY HEAD} = .05*(1.752) = 0.088

NODE 120.87 : **HGL** = < 529.999>;EGL= < 531.564>;FLOWLINE= < 528.340>

****

FLOW PROCESS FROM NODE 120.87 TO NODE 120.88 IS CODE = 1
UPSTREAM NODE 120.88 ELEVATION = 530.69 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 45.09 CFS PIPE DIAMETER = 42.00 INCHES
PIPE LENGTH = 234.52 FEET MANNING'S N 0.01300

```
  NORMAL DEPTH(FT) =      1.64           CRITICAL DEPTH(FT) =      2.09
============================== ========== ========== ==========
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     2.09
============================== ========== ========== ==========
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH  VELOCI'.rY     SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)     (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          2.089       7.527         2.969           995.02
         0.086          2.071       7.605         2.969           995.19
         0.291          2.053       7.685         2.971           995.59
         0.626          2.035       7.766         2.972           996.22
         1.102          2.017       7.850         2.975           997.09
         1.736          1.999       7.936         2.978           998.19
         2.543          1.981       8.024         2.982           999.55
         3.543          1.963       8.113         2.986          1001.15
         4.758          1.946       8.205         2.992          1003.01
         6.217          1.928       8.299         2.998          1005.14
         7.950          1.910       8.396         3.005          1007.53
         9.998          1.892       8.495         3.013          1010.20
        12.407          1.874       8.596         3.022          1013.16
        15.237          1.856       8.700         3.032          1016.40
        18.562          1.838       8.806         3.043          1019.94
        22.479          1.820       8.915         3.055          1023.79
        27.114          1.802       9.027         3.068          1027.95
        32.639          1.784       9.141         3.083          1032.43
        39.293          1.766       9.259         3.099          1037.24
        47.429          1.749       9.380         3.116          1042.39
        57.592          1.731       9.504         3.134          1047.88
        70.698          1.713       9.631         3.154          1053.74
        88.460          1.695       9.762         3.175          1059.97
       114.732          1.677       9.896         3.199          1066.58
       161.876          1.659      10.034         3.223          1073.57
       234.520          1.659      10.037         3.224          1073.75
------------------------------------------ ------------------------------
  NODE    120.88 : HGL "' <  532.779>;EGL= <  533.659>;FLOWLINE= <  530.690>

**************************************************************************    ****
  FLOW PROCESS FROM NODE   120.88 TO NODE   120.88 rS CODE =  5
  UPSTREAM NODE   120.88     ELEVATION =   531.19   (FLOW IS AT CRITICAL DEPTH)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER   ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
     UPSTREAM      26.67      30.00     89.00     531.19       1.76        5.433
    DOWNSTREAM     45.09      42.00               530.69       2.09        7.507
    LATERAL #1     18.42      24.00      0.00     531.19       1.55        5.863
    LATERAL #2      0.00       0.00      0.00       0.00       0.00        0.000
       Q5           0.00== Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY= (Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00423
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00449
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00436
  JUNCTION LENGTH =    4.00 FEET
```

```
  FRICTION LOSSES     0.017 FEET          ENTRANCE LOSSES =   0.000 FEET
  JUNCTION LOSSES    {DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 0.898)+( 0.000) =   0.898

  NODE    120.88 : HGL = <  534.099>;EGL= <  534.557>;FLOWLINE= <  531.190>

****************************************************************************
  FLOW PROCESS FROM NODE    120.88 TO NODE  7002.00 IS CODE =  1
  UPSTREAM NODE  7002.00     ELEVATION =   532.50  (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD) :
  PIPE FLOW          26.67 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =      90.62 FEET          MANNING'S N 0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH{FT) =      1.31           CRITICAL DEPTH{FT) =      1.76
=====   ========================== ========================================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH{FT) =     1.76
=========   ==========================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
----------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)           (FT)    {FT/SEC)    ENERGY( FT)    MOMENTUM( POUNDS)
         0.000          1.760      7.217         2.570          552.60
         0.044          1.742      7.299         2.570          .552.68
         0.182          1.724      7.383         2.571          552.94
         0.421          1.706      7.470         2.573          553.38
         0.773          1.688      7.559         2.576          553.99
         1.248          1.670      7.650         2.580          554.79
         1.861          1.652      7.745         2.584          555.79
         2.625          1.634      7.843         2.590          556.98
         3.561          1.616      7.943         2.596          558.37
         4.688          1.598      8.046         2.604          559.97
         6.033          1.580      8.153         2.613          561.79
         7.627          1.562      8.263         2.623          563.82
         9.508          1.544      8.377         2.634          566.09
        11.723          1.526      8.494         2.647          568.59
        14.333          1.508      8.615         2.661          571.33
        17.413          1.490      8.739         2.677          574.32
        21.065          1.472      8.868         2.694          577.57
        25.426          1.454      9.001         2.713          581.08
        30.690          1.436      9.139         2.734          584.88
        37.137          1.418      9.280         2.756          588.96
        45.206          1.400      9.427         2.781          593.34
        55.630          1.382      9.579         2.807          598.02
        69.782          1.364      9.736         2.837          603.03
        90.620          1.346      9.897         2.868          608.33

  HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS
=================  ============================================================
  DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     2.91
=== ============ ==========================================  ===============
  PRESSURE FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      PRESSURE   VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT}       HEAD(FT)   {FT/SEC}     ENERGY(FT)     MOMENTUM(POUNDS }
```

```
         0.000          2.909       5.433          3.367          788.82
        39.942          2.500       5.433          2.958          663.69
================== ================================ ====================
  ASSUMED DOWNSTREAM PRESSURE HEAD(FT)       2.50
================================================== ======================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC       PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)   ENERGY (FT)   MOMENTUM(POUNDS)
        39.942          2.500      5.431         2.958          663.69
        42.587          2.470      5.443         2.931          655.25
        45.020          2.441      5.465         2.905          647.34
        47.330          2.411      5.493         2.880          639.82
        49.543          2.382      5.527         2.856          632.62
        51.672          2.352      5.565         2.833          625.72
        53.724          2.323      5.608         2.811          619.12
        55.706          2.293      5.655         2.790          612.80
        57.619          2.263      5.705         2.769          606.76
        59.466          2.234      5.760         2.749          601.01
        61.245          2.204      5.819         2.730          595.55
        62.957          2.175      5.882         2.712          590.37
        64.599          2.145      5.948         2.695          585.49
        66.170          2.115      6.019         2.678          580.91
        67.665          2.086      6.093         2.663          576.64
        69.081          2.056      6.172         2.648          572.68
        70.413          2.027      6.255         2.635          569.04
        71.654          1.997      6.342         2.622          565.73
        72.797          1.968      6.434         2.611          562.77
        73.834          1.938      6.530         2.600          560.16
        74.754          1.908      6.631         2.592          557.91
        75.546          1.879      6.737         2.584          556.04
        76.196          1.849      6.849         2.578          554.56
        76.687          1.820      6.966         2.574          553.48
        77.000          1.790      7.089         2.571          552.82
        77.110          1.760      7.217         2.570          552.60
        90.620          1.760      7.217         2.570          552.60
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------

 PRESSURE+MOMENTUM BALANCE OCCURS AT    66.47 FEET UPSTREAM OF NODE  120.88
       DOWNSTREAM DEPTH = 2.110 FEET, UPSTREAM CONJUGATE DEPTH = 1.459 FEET

  NODE   7002.00 : HGL =<  534.260>;EGL=<  535.070>;FLOWLINE=<  532.500>

****************************************************    **********************
  FLOW PROCESS FROM NODE  7002.00 TO NODE  7002.00 IS CODE =  8
  UPSTREAM NODE  7002.00     ELEVATION =   532.50  (FLOW IS AT CRITICAL DEPTH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       26.67 CFS        PIPE DIAMETER =  30.00 INCHES
  FLOW VELOCITY  =  7.22  FEET/SEC.   VELOCITY HEAD  =  0.809 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.809) =  0.162

  NODE  7002.00 : HGL  =<  535.232>;EGL=<  535.232>;FLOWLINE=<  532.500>

***** ****************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER    7002.00            FLOWLINE ELEVATION =   532.50
  ASSUMED UPSTREAM CONTROL HGL =    534.26 FOR DOWNSTREAM RUN ANALYSIS
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========== =;==========

END OF GRADUALLY VARIED FLOW ANALYSIS

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
(Reference: LACFCD, LACRD, AND OCEMA HYDRAULICS CRITERION)
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Ver. 8.0 Release Date: 01/01/2003 License ID 1261

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DESCRIPTION OF STUDY

McMILLIN OTAY RANCH VILLAGE 7 **J-14531-A**
PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12086 TO 12063 LATERAL)
50-YR STORM EVENT, ULTIMATE CONDITION **BY:PT**

FILE NAME: A:/12000.PIP
TIME/DATE OF STUDY: 20:08 09/27/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
120.86-1	FRICTION	3.00*	1031.28	1.62	838.80
120.80-1	JUNCTION	2.40*	842.50	1.67	826.51
120.80-)	FRICTION	2.20	730.56	1.47*	764.79
120.61-1	JUNCTION	1.88*Dc	703.31	1.88*Dc	703.31
120.61-I	FRICTION	2.96*	967.06	1.66	785.24
	} HYDRAULIC JUMP				
120.41-1	JUNCTION	1.97 De	754.01	1.59*	800.42
120.41-}	FRICTION	1.97 De	754.01	1.58*	805.09
120.42-	JUNCTION	1.97*De	754.01	1.97*Dc	754.01
120.42-}	FRICTION	2.40	628.14	1.19*	634.18
120.49-)	JUNCTION	1.73 De	530.04	1.28*	596.67
120.49-1	FRICTION	1.91	481.26	1.11*	575.34
120.50-}	JUNCTION	1.67*Dc	468.26	1.67*Dc	468.27
120.50-1	FRICTION	2.44*	417.17	0.82	375.62
	} HYDRAULIC JUMP				
120.57-		1.39 De	270.83	0.90*	340.84

```
      } MANHOLE
  120.57-              1.39 De          270.83        0.97*            318.57
      } FRICTION
  120.58-              1.39*Dc          270.83        l.39*Dc          270.83
      ) JUNCTION
  120.58-              2.49*            367.38        1.10             264.82
      } FRICTION
  120.62-              2.27*            342.41        1.34 De          251.31
      } JUNCTION
  120.62-              2.75*            315.49        0.72             214.02
      } FRICTION
  120.63-              1.80*            210.33        1.18 De          161.82
      } CATCH BASIN
  120.63-              2.31*            172.48        1.18 De           49.49
--------------------------------------------------------------------------------
  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
************************************ ************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   120.86            FLOWLINE ELEVATION =   527.79
  PIPE FLOW =      36.72 CFS        PIPE DIAMETER =  36.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =  530.790 FEET

  NODE   120.86 : HGL = <  530.790>;EGL= <  531.209>;FLOWLINE= <  527.790>

************************************************ ******************************
  FLOW PROCESS FROM NODE   120.86 TO NODE   120.80 IS CODE =  1
  UPSTREAM NOOE   120.80    ELEVATION =   528.42   (FLOW SEALS IN REACH)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          36.72 CFS     PIPE DIAMETER =  36.00 INCHES
  PIPE LENGTH =      64.50 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      1.60          CRITICAL DEPTH(FT) =      1.97
================== ============================== ====================
  DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     3.00
==========;================================ ==================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
--------------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH   VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)         (FT)     (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
        0.000          3.000       5.193          3.419          1031.28
        5.639          2.959       5.207          3.380          1014.14
       10.880          2.918       5.233          3.343           997.92
       15.897          2.876       5.267          3.308           982.35
       20.740          2.835       5.307          3.273           967.37
       25.435          2.794       5.353          3.239           952.95
       29.997          2.753       5.405          3.207           939.07
       34.437          2.712       5.461          3.175           925.74
       38.759          2.671       5.523          3.145           912.95
       42.966          2.629       5.590          3.115           900.72
       47.057          2.588       5.661          3.086           889.06
       51.030          2.547       5.738          3.059           877.97
       54.881          2.506       5.820          3.032           867.48
```

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        58.603          2.465       5.907          3.007          857.61
        62.188          2.424       6.000          2.983          848.36
        64.500          2.396       6.065          2.967          842.50

  NODE    120.80 : HGL = <  530.816>;EGL= <  531.387>;FLOWLINE= <  528.420>

********************* ************************************ ******************
  FLOW PROCESS FROM NODE    120.80 TO NODE    120.80 IS CODE =  5
  UPSTREAM NODE   120.80     ELEVATION =   528.75   (FLOW IS SUBCRITICAL)
  (NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE   CRITICAL   VELOCITY
                  (CFS)    (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
     UPSTREAM      33.47     36.00       5.00     528.75       1.88        9.733
    DOWNSTREAM     36.72     36.00                528.42       1.97        6.068
    LATERAL #1      0.34     18.00      85.00     530.26       0.22        1.688
    LATERAL #2      2.91     18.00      85.00     530.26       0.65        3.980
       Q5           0.00===Q5 EQUALS BASIN INPUT=== .

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY= (Q2*V2-Ql*Vl*COS( DELTA1)-Q3*V3*COS (DELTA3)-
      Q4*V4*COS(DELTA4) )/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:     MANNING'S N  = 0.01300;  FRICTION SLOPE = 0.01084
  DOWNSTREAM:   MANNING'S N  = 0.01300;  FRICTION SLOPE = 0.00318
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.0070i
  JUNCTION LENGTH      4.00 FEET
  FRICTION LOSSES     0.028 FEET          ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 0.302)+(  0.000) =    0.302

  NODE    120.80 : HGL = <  530.218>;EGL= <  531.689>;FLOWLINE= <  528.750>

*************************************************************************.
  FLOW PROCESS FROM NODE    120.80 TO NODE    120.61 IS CODE =  1
  UPSTREAM NODE   120.61     ELEVATION =   531.09   (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LO$SES(LACFCD):
  PIPE FLOW          33.47 CFS      PIPE DIAMETER =  36.00 INCHES
  PIPE LENGTH =     207.65 FEET           MANNING'S N     0.01300

  NORMAL DEPTH(FT) =                      CRITICAL DEPTH(FT) =      1.88
==========================================================  ==============  ========
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.88
==============================================     ==========================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
------------------------------------------------------------     -------------
  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM (POUNDS)
          0.000         1.877      7.192          2.680          703.31
          0.057         1.860      7.269          2.681          -,03.41
          0.216         1.843      7.348          2.682          703.69
          0.487         1.826      7.429          2.683          704.15
          0.881         1.809      7.512          2.686          704.79
          1.410         1.792      7.598          2.689          705.63
          2.090         1.775      7.685          2.692          706.65
          2.937         1.758      7.775          2.697          707.87
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        3.971          1.741          7.867          2.702          709.30
        5.215          1.724          7.961          2.708          710.94
        6.697          1.707          8.058          2.716          712.78
        8.452          1.690          8.157          2.724          714.85
       10.520          1.673          8.259          2.733          717.14
       12.954          1.656          8.364          2.743          719.66
       15.817          1.639          8.472          2.754          722.42
       19.194          1.622          8.582          2.766          725.42
       23.194          1.605          8.695          2.779          728.67
       27.968          1.588          8.812          2.794          732.18
       33.722          1.571          8.932          2.810          735.96
       40.765          1.554          9.055          2.828          740.00
       49.570          1.537          9.182          2.847          744.33
       60.933          1.520          9.312          2.867          748.95
       76.346          1.503          9.446          2.889          753.87
       99.161          1.486          9.585          2.913          759.09
      140.130          1.469          9.727          2.939          764.64
      207.650          1.468          9.730          2.939          764.79
-------------------------------------------------------------------------------
  NODE   120.61 : HGL = <  532.967>;EGL= <  533.770>;FLOWLINE= <  531.090>

********** ********************************  ********************************
  FLOW PROCESS FROM NODE   120.61 TO NODE   120.61 IS CODE =  5
  UPSTREAM NODE   120.61    ELEVATION =   531.59   (FLOW UNSEALS IN REACH)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)   (FT/SEC)
     UPSTREAM      33.47     30.00      90.00     531.59       1.97         6.818
    DOWNSTREAM     33.47     36.00                531.09       1.88         7.187
    LATERAL #1      0.00      0.00       0.00       0.00       0.00         0.000
    LATERAL #2      0.00      0.00       0.00       0.00       0.00         0.000
       Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
  UPSTREAM :   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00666
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00491
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00578
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.023 FEET          ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 1.505)+( 0.000) =    1.505
  ---------------------------------------- ----  -----------------------
  NODE   120.61 : HGL = <  534.553>;EGL= <  535.275>;FLOWLINE= <  531.590>

**********,**********  ********************  ****************************
  FLOW PROCESS FROM NODE   120.61 TO NODE   120.41 IS CODE =  1
  UPSTREAM NODE   120.41    ELEVATION =   534.16   (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW         33.47 CFS      PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =     233.87 FEET          MANNING'S N     0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS
```

NORMAL DEPTH(FT) = 1.66 CRITICAL DEPTH(FT) = 1.97

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.59

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY (FT)	PRESSURE+ MOMENTUM (POUNDS)
0.000	1.594	10.133	3.189	800.42
2.633	1.596	10.113	3.185	799.71
5.358	1.599	10.094	3.182	799.02
8.185	1.601	10.076	3.179	798.32
11.122	1.604	10.057	3.175	797.64
14.180	1.606	10.038	3.172	796.96
17.372	1.609	10.019	3.169	796.29
20.712	1.612	10.001	3.166	795.63
24.217	1.614	9.982	3.162	794.97
27.908	1.617	9.964	3.159	794.31
31.808	1.619	9.945	3.156	793.67
35.945	1.622	9.927	3.153	793.03
40.356	1.625	9.909	3.150	792.39
45.085	1.627	9.891	3.147	791.77
50.185	1.630	9.873	3.144	791.14
55.730	1.632	9.855	3.141	790.53
61.811	1.635	9.837	3.139	789.92
68.556	1.638	9.819	3.136	789.31
76.144	1.640	9.801	3.133	788.72
84.833	1.643	9.784	3.130	788.12
95.028	1.645	9.766	3.127	787.54
107.406	1.648	9.749	3.125	786.96
123.235	1.651	9.731	3.122	786.38
145.364	1.653	9.714	3.119	785.82
182.936	1.656	9.697	3.117	785.25
233.870	1.656	9.696	3.117	785.24

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.96

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL (FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.963	6.818	3.685	967.06
107.003	2.500	6.818	3.222	825.13

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 2.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM (POUNDS)
107.003	2.500	6.816	3.222	825.13
111.196	2.479	6.825	3.203	819.21
114.815	2.457	6.842	3.185	813.78
118.129	2.436	6.864	3.168	808.69
121.219	2.415	6.889	3.152	803.88

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        124.124          2.394      6.918          3.137          799.33
        126.872          2.372      6.950          3.123          795.02
        129.480          2.351      6.986          3.109          790.93
        131.961          2.330      7.024          3.096          787.06
        134.322          2.308      7.065          3.084          783.41
        136.568          2.287      7.108          3.072          779.96
        138.705          2.266      7.155          3.061          776.72
        140.733          2.245      7.203          3.051          773.69
        142.652          2.223      7.254          3.041          770.87
        144.463          2.202      7.308          3.032          768.26
        146.163          2.181      7.365          3.023          765.85
        147.748          2.159      7.423          3.016          763.66
        149.213          2.138      7.485          3.009          761.68
        150.553          2.117      7.549          3.002          759.92
        151.760          2.096      7.615          2.997          758.38
        152.824          2.074      7.685          2.992          757.07
        153.735          2.053      7.757          2.988          755.98
        154.478          2.032      7.831          2.985          755.12
        155.036          2.010      7.909          2.982          754.51
        155.390          1.989      7.989          2.981          754.13
        155.514          1.968      8.073          2.980          754.01
        233.870          1.968      8.073          2.980          754.01
-------'-.:..---------------END OF HYDRAULIC JUMP ANALYSIS----------------------
1 PRESSURE+MOMENTUM BALANCE OCCURS AT   131.87 FEET UPSTREAM OF NODE  120.61 I
I       DOWNSTREAM DEPTH = 2.331 FEET, UPSTREAM CONJUGATE DEPTH = 1.647 FEET I

  NODE    120.41 : HGL = <  535.753>;EGL= <  537.349>;FLOWLINE= <  534.160>

********************************************************************************
  FLOW PROCESS FROM NODE   120.41 TO NODE   120.41 IS CODE =  5
  UPSTREAM NODE   120.41     ELEVATION =   534.66  (FLOW IS SUPERCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW    DIAMETER   ANGLE    FLOWLINE   CRITICAL   VELOCITY
                   (CFS)   (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
     UPSTREAM      33.47    30.00     30.00    534.66      1.97       10.260
    DOWNSTREAM     33.47    30.00              534.16      1.97       10.136
    LATERAL #1      0.00     0.00      0.00      0.00      0.00        0.000
    LATERAL #2      0.00     0.00      0.00      0.00      0.00        0.000
       Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3) -
      Q4*V4*COS(DELTA4) )/( (Al+A2)*16.l)+FRICTION LOSSES
..__UPSTREAM;    MANNING'S N.= 0..01300;  FRICTION SLOPE = 0.01270
  DOWNSTREAM:   MANNING'S N  - 0.01300;  FRICTION SLOPE - 0.01231
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01251
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.050 FEET          ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES    {DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    { 0.523)+{ 0.000) =   0.523

  NODE    120.41 : HGL = <  536.237>;EGL= <  537.872>;FLOWLINE= <  534.660>

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  FLOW PROCESS FROM NODE   120.41 TO NODE   120.42 IS CODE =  1
  UPSTREAM NODE   120.42     ELEVATION =   535.61  (FLOW IS SUPERCRITICAL)
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 CALCULATE FRICTION LOSSES(LACFCD ):
 PIPE FLOW          33.47 CFS     PIPE DIAMETER =  30.00 INCHES
 PIPE LENGTH =      65.25 FEET          MANNING'S N0.01300

 NORMAL DEPTH(FT) =      1.51           CRITICAL DEPTH(FT) =      1.97
========= === ================================================== === =====
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.97
==========================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
--------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC       PRESSURE+
  CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)   MOMENTUM(POUNDS)
        0.000          1.968      8.073          2.980          754.01
        0.051          1.949      8.147          2.981          754.10
        0.212          1.931      8.224          2.982          754.39
        0.490          1.912      8.304          2.984          754.88
        0.897          1.894      8.386          2.987          755.58
        1.445          1.876      8.470          2.990          756.48
        2.149          1.857      8.557          2.995          757.60
        3.025          1.839      8.647          3.000          758.93
        4.095          1.820      8.739          3.007          760.49
        5.380          1.802      8.834          3.014          762.27
        6.910          1.783      8.932          3.023          764.30
        8.718          1.765      9.033          3.033          766.56
       10.847          1.746      9.137          3.044          769.07
       13.348          1.728      9.245          3.056          771.84
       16.287          1.709      9.355          3.069          774.87
       19.749          1.691      9.469          3.084          778.17
       23.845          1.673      9.587          3.100          781.74
       28.727          1.654      9.708          3.118          785.61
       34.606          1.636      9.833          3.138          789.77
       41.793          1.617      9.961          3.159          794.23
       50.770          1.599     10.094          3.182          799.01
       62.344          1.580     10.231          3.207          804.11
       65.250          1.577     10.257          3.212          805.09
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 NODE   120.42 : HGL = <  537.578>;EGL=<  538.590>;FLOWLINE= <  535.610>

**************************  ******************  ***************************
 FLOW PROCESS FROM NODE   120.42 TO NODE   120.42 IS CODE =  5
 UPSTREAM NODE   120.42     ELEVATION =   535.94  (FLOW UNSEALS IN REACH)
 (NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)

 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                  (CFS)    (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
   UPSTREAM       23.96      24.00      0.00      535.94       1.73       12.317
  DOWNSTREAM      33.47      30.00                535.61       1.97        8.075
  LATERAL U        6.01      18.00     90.00      536.44       0.95        5.113
  LATERAL #2       3.50      Hi.00     67.00      536.44       0.71        3.108
     Q5            0.00==Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY= (Q2*V2-Ql*Vl*COS(DELTA1 )-Q3*V3*COS(DELTA3)-
     Q4*V4*COS (OELTA4) )/((Al+A2)*16.l)+FRICTION LOSSES
 UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02561
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 DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00720
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01641
 JUNCTION LENGTH     4.00 FEET
 FRICTION LOSSES    0.066 FEET         ENTRANCE LOSSES    0.000 fEET
 JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES   ( 0.894)+( 0.000) =   0.894

 NODE   120.42 : HGL = <  537.128>;EGL= <  539.484>;FLOWLINE= <  535.940>

**********************************************************    ********************
 FLOW PROCESS FROM NODE   120.42 TO NODE   120.49 IS CODE =  1
 UPSTREAM NODE   120.49     ELEVATION =   538.89  (FLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD) :
 PIPE FLOW          23.96 CFS     PIPE DIAMETER =  24.00 INCHES
 PIPE LENGTH =     111.49 FEET          MANNING'S N     0.01300

 NORMAL DEPTH(FT) =      1.18           CRITICAL DEPTH(FT) =      1.73
==========================================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.28
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 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL (FT)          (FT)    (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
        0.000         1.283     11.246         3.248          596.67
        1.832         1.279     11.289         3.259          598.14
        3.761         1.275     11.334         3.271          599.62
        5.797         1.271     11.378         3.282          601.12
        7.949         1.266     11.423         3.294          602.65
       10.228         1.262     11.468         3.306          604.19
       12.649         1.258     11.514         3.318          605.76
       15.226         1.253     11.561         3.330          607.35
       17.977         1.249     11.607         3.342          608.97
       20.923         1.245     11.654         3.355          610.60
       24.089         1.240     11.702         3.368          612.26
       27.508         1.236     11.750         3.381          613.94
       31.214         1.232     11.798         3.395          615.64
       35.256         1.227     11.847         3.408          617.37
       39.691         1.223     11.896         3.422          619.12
       44.594         1.219     11.946         3.436          620.89
       50.066         1.215     11.997         3.451          622.69
       56.239         1.210     12.047         3.465          624.51
       63.302         1.206     12.098         3.480          626.35
       71.531         1.202     12.150         3.495          628.23
       81.353         1.197     12.202         3.511          630.12
       93.483         1.193     12.255         3.527          632.04
      109.264         1.189     12.308         3.543          633.99
      111.490         1.188     12.314         3.544          634.18
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 NODE   120.49 : HGL = <  540.173>;EGL= <  542.138>;FLOWLINE= <  538.890>

*************+.*********************************************   ***************
 FLOW PROCESS FROM NODE   120.49 TO NODE   120.49 IS CODE    5
 UPSTREAM NODE   120.49     ELEVATION =   539.22   (FLOW IS SUPERCRITICAL)

 CALCULATE JUNCTION LOSSES :
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PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (t'T/SEC)
UPSTREAM	21.98	24.00	0.00	539.22	1.67	12.256
DOWNSTREAM	23.96	24.00		538.89	1.73	11.249
LATERAL #1	1.98	18.00	90.00	539.72	0.53	3.523
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED;
DY= (Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.02660
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.02034
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.02347
JUNCTION LENGTH 4.00 FEET
FRICTION LOSSES 0.094 FEET ENTRANCE LOSSES 0.000 FEET
JUNCTION LOSSES (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES (0.525)+(0.000) = 0.525

NODE 120.49 : **HGL** = < 540.332>;EGL= < 542.664>;FLOWLINE= < 539.220>

**********"k**
FLOW PROCESS FROM NODE 120.49 TO NODE 120.50 IS CODE = 1
UPSTREAM NODE 120.50 ELEVATION = 545.17 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 21.98 CFS PIPE DIAMETER = 24:00 INCHES
PIPE LENGTH = 209.51 rEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 1.09 CRITICAL DEPTH(t'T) = 1.67
==========
UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = ' 1.67
========== ========== ==========
GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM (POUNDS)
0.000	1.670	7.842	2.625	468.27
0.056	1.647	7.941	2.626	468.45
0.198	I.623	8.045	2.629	468.91
0.433	1.600	8.155	2.633	469.65
0.770	1.577	B.270	2.640	470.69
1.218	1.554	8.391	2.648	472.02
1.789	I.530	8.518	2.658	473.66
2.497	I.507	B.651	2.670	475.62
3.359	1.484	8.790	2.685	477.92
4.392	1.461	8.937	2.702	480.56
5.621	I.438	9.090	2.722	483.56
7.075	1.414	9.251	2.744	486.94
8.787	1.391	9.419	2.770	490.71
10.802	1.368	9.596	2.799	494.90
13.175	1.345	9.782	2.831	499.51
15.977	I.322	9.976	2.868	504.57
19.301	1.298	10.180	2.909	510.10
23.274	1.275	10.394	2.954	516.13
28.077	1.252	10.619	3.004	522.69
33.971	1.229	10.856	3.060	529.80

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        41.362          1.205      11.104          3.121          537.50
        50.934          1.182      11.366          3.189          545.81
        63.967          1.159      11.642          3.265          554.78
        83.338          1.136      11.932          3.348          564.45
       118.279          1.113      12.238          3.440          574.87
       209.510          1.112      12.252          3.444          575.34

  NODE    120.50  : HGL  =  <  546.840>;EGL= <  547.795>;FLOWLINE=  <  545.170>

**********************************  ****************  ********************
  FLOW PROCESS FROM NODE    120.50 TO NODE    120.50 IS CODE =  5
  UPSTREAM NODE    120.50     ELEVATION =    545.50   (FLOW UNSEALS IN REACH)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE   CRITICAL    VELOCITY
                   (CFS)    (INCHES)  (DEGREES)  ELEVATION  DEPTH(FT.)   (FT/SEC)
     UPSTREAM       14.78     24.00       0.00     545.50       1.39         4.705
    DOWNSTREAM      21.98     24.00                545.17       1.67         7.826
    LATERAL #1       3.06     18.00      90.00     546.00       0.67         1.789
    LATERAL #2       4.14     18.00      90.00     546.00       0.78         2.420
       Q5            0.00===Q5 EQUALS BASIN INPUT,,.,==

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(OELTA4) )/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM :    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00427
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00910
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00669
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.027 FEET         ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES   ( 0.489)+(  0.000) =    0.489

  NODE    120.50 : HGL  =  <  547.94l>;EGL=<  548.284>;FLOWLINE=<  545.500>

*************************************************************************
  FLOW PROCESS FROM NODE    120.50 TO NODE    120.57 IS CODE =  1
  UPSTREAM NODE    120.57     ELEVATION =    554.08   (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          14.78 CfS      PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =     245.00 fEET          MANNING'S N     0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT) -       0.82          CRITICAL DEPTH(FT) -       1.39

  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.90
============ ================================   ==========  ==========
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
          0.000         0.901     10.762         2.700          340.84
          1.403         0.898     10.815         2.715          342.08
          2.880         0.894     10.869         2.730          343.33
          4.436         0.891     10.924         2.745          344.60
```

6.079	0.887	10.979	2.760	345.89
7.818	0.884	11.034	2.776	347.20
9.663	0.880	11.090	2.792	348.52
11.624	0.877	11.147	2.808	349.86
13.716	0.874	11.204	2.824	351.22
15.955	0.870	11.262	2.841	352.60
18.359	0.867	11.320	2.858	353.99
20.952	0.863	11.379	2.875	355.40
23.761	0.860	11.439	2.893	356.83
26.821	0.857	11.499	2.911	358.28
30.177	0.853	11.560	2.929	359.74
33.884	0.850	11.621	2.948	361.23
38.018	0.846	11.683	2.967	362.73
42.678	0.843	11.745	2.986	364.26
48.007	0.840	11.809	3.006	365.80
54.210	0.836	11.873	3.026	367.37
61.610	0.833	11.937	3.047	368.95
70.742	0.829	12.002	3.068	370.56
82.616	0.826	12.068	3.089	372.18
99.494	0.822	12.135	3.110	373.83
128.643	0.819	12.202	3.132	375.50
245.000	0.819	12.207	3.134	375.62

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.44

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.441	4.705	2.784	417.17
14.329	2.000	4.705	2.344	330.79

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 2.00

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
14.329	2.000	4.703	2.344	330.79
15.073	1.975	4.714	2.321	326.28
15.768	1.951	4.734	2.299	322.05
16.433	1.926	4.760	2.278	318.02
17.072	1.902	4.791	2.258	314.15
17.689	1.877	4.826	2.239	310.44
18.286	1.852	4.865	2.220	306.89
18.862	1.828	4.908	2.202	303.48
19.418	1.803	4.955	2.185	300.23
19.955	1.779	5.005	2.168	297.12
20.472	1.754	5.059	2.152	294.17
20.968	1.730	5.117	2.136	291.37
21.443	1.705	5.179	2.122	288.73
21.896	1.680	5.244	2.108	286.24
22.326	1.656	5.313	2.094	283.92
22.731	1.631	5.386	2.082	281.77
23.111	1.607	5.462	2.070	279.80

```
        23.462          1.582       5.543          2.060          278.00
        23.784          1.557       5.629          2.050          276.39
        24.073          1.533       5.719          2.041          274.96
        24.328          1.508       5.813          2.033          273.74
        24.546          1.484       5.912          2.027          272.72
        24.722          1.459       6.017          2.022          271.91
        24.854          1.435       6.126          2.018          271.32
        24.937          1.410       6.242          2.015          270.96
        24.966          1.385       6.363          2.014          270.83
       245.000          1.385       6.363          2.014          270.83
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
! PRESSURE+MOMENTUM BALANCE OCCURS AT     6.89 FEET UPSTREAM OF NODE  120.50 !
       DOWNSTREAM DEPTH = 2.229 FEET, UPSTREAM CONJUGATE DEPTH = 0.819 FEET !

  NODE    120.57 : HGL = <  554.981>;EGL= <  556.780>;FLOWLINE= <  554.080>

****************************************************************     ***********
  FLOW PROCESS FROM NODE   120.57 TO NODE   120.57 IS CODE =  2
  UPSTREAM NODE   120.57    ELEVATION =   554.41   (FLOW IS SUPERCRITICAL)

  CALCULATE MANHOLE LOSSES(LACFCD):
  PIPE FLOW =      14.78 CFS            PIPE DIAMETER    24.00 INCHES
  AVERAGED VELOCITY HEAD =  1.640 FEET
  HMN = .05*(AVERAGED VELOCITY HEAD) = .05*( 1.640) =  0.082

  NODE    120.57 : HGL = <  555.381>;EGL= <  556.862>;FLOWLINE= <  554.410>

*****************************************************************************
  FLOW PROCESS FROM NODE   120.57 TO NODE   120.58 IS CODE =  1
  UPSTREAM NODE   120.58    ELEVATION =   557.99   (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          14.78 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =     179.00 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      0.95          CRITICAL DEPTH(FT) =      1.39

  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.39
======;===================================;==    = ======================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-----------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH   VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS}
          0.000         1.385       6.363          2.014          270.83
          0.032         1.368.      6.452          2.015          270.90
          0.130         1.351       6.544          2.016          271.08
          0.302         1.334       6.639          2.019          271.40
          0.555         1.317       6.737          2.022          271.85
          0.898         1.299       6.839          2.026          272.44
          1.340         1.282       6.945          2.032          273.17
          1.893         1.265       7.055          2.038          274.05
          2.570         1.248       7.169          2.046          275.08
          3.389         1.230       7.287          2.056          276.28
          4.368         1.213       7.410          2.066          277.63
          5.531         1.196       7.538          2.079          279.16
          6.906         1.179       7.670          2.093          280.86
          8.529         1.162       7.808          2.109          282.75
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        10.445          1.144       7.951          2.126          284.83
        12.712          1.127       8.099          2.146          287.11
        15.407          1.110       8.254          2.168          289.61
        18.633          1.093       8.415          2.193          292.31
        22.536          1.075       8.583          2.220          295.25
        27.329          1.058       8.758          2.250          298.43
        33.343          1.041       8.940          2.283          301.86
        41.132          1.024       9.130          2.319          305.55
        51.735          1.007       9.328          2.359          309.51
        67.489          0.989       9.536          2.402          313.77
        95.890          0.972       9.753          2.450          318.33
       179.000          0.971       9.763          2.452          318.57

  NODE    120.58 : HGL =  <  559.375>;EGL= <  560.004>;FLOWLINE= <  557.990>

**************** ****** ********* ************ ********************************
  FLOW PROCESS FROM NODE   120.58 TO NODE   120.58 IS CODE =  5
  UPSTREAM NODE   120.58    ELEVATION =   558.32   (FLOW UNSEALS IN REACH)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES)  (DEGREES) ELEVATION   DEPTH(FT.)   (FT/SEC)
     UPSTREAM      12.64     18.00      90.00     558.32       1.34         7.153
    DOWNSTREAM     14.78     24.00                557.99       1.39         6.365
    LATERAL #1      2.14     18.00      33.00     558.82       0.55         1.338
    LATERAL #2      0.00      0.00       0.00       0.00       0.00         0.000
       Q5           0.00===Q5 EQUALS BASIN  INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)  -Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4) )/( (Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.01448
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00626
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01037
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.041 FEET         ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES   ( 1.603)+( 0.000) =   1.603

  NODE    120.58 : HGL =  <  560.813>;EGL= <  561.607>;FLOWLINE= <  558.320>

******************************** *************** ************** **************
  FLOW PROCESS FROM NODE   120.58 TO NODE   120.62 IS CODE =  1
  UPSTREAM NODE   120.62    ELEVATION =   559.14   (FLOW IS UNDER PRESSURE)
---------- ----- ---------------- ------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          12.64 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH        40.99 FEET          MANNING'S N     0.01300
  SF=(Q/K)**2    ((     12.64)/(   105.045))**2 = 0.01448
  HF=L*SF = (     40.99)*(0.01448) =      0.594

  NODE    120.62 : HGL =  <  561.406>;EGL= <  562.201>;FLOWLINE= <  559.140>

********************************************************************************
  FLOW PROCESS FROM NODE   120.62 TO NODE   120.62 IS CODE =  5
  UPSTREAM NODE   120.62    ELEVATION =   559.47   (FLOW IS UNDER PRESSURE)
```

```
  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES)  (DEGREES) ELEVATION   DEPTH(FT.)   (FT/SEC)
     UPSTREAM        9.29     18.00      23.00     559.47       1.18         5.257
    DOWNSTREAM      12.64     18.00                559.14       1.34         7.153
    LATERAL  #1      3.35     18.00      76.00     559.64       0.70         1.896
    LATERAL  #2      0.00      0.00       0.00       0.00       0.00         0.000
       Q5            0.00===QS EQUALS  BASIN INPUT===

  LACFCD AND OCEMA rLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00782
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.01448
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.01115
  JUNCTION LENGTH      4.00 FEET
  FRICTION LOSSES     0.045 FEET          ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 0.451)+{ 0.000) =    0.451

  NODE    120.62  : HGL = <  562.223>;EGL= <  562.652>;FLOWLINE= <  559.470>

****************************************   ******************************  * ***
  FLOW PROCESS FROM NODE    120.62 TO NODE    120.63 IS CODE =  1
  UPSTREAM NODE   120.63     ELEVATION =    560.49  {FLOW IS UNDER PRESSURE)

  CALCULATE FRICTION LOSSES{LACrCD):
  PIPE FLOW            9.29 CFS      PIPE DIAMETER =  18.00 INCHES
  PIPE  LENGTH         8.49 FEET           MANNING'S N      0.01300
  SF={Q/K)**2    ((      9.29)/(   105.043))**2 = 0.00782
  HF=L*SF =  (      8.49)*(0.00782)  =       0.066

  NODE    120.63  : HGL = <  562.289>;EGL= <  562.718>;FLOWLINE= <  560.490>

 ****************************************************************************
  FLOW PROCESS FROM NODE    120.63 TO NODE    120.63 IS CODE =  8
  UPSTREAM NODE   120.63     ELEVATION =    560.49  (FLOW IS UNDER  PRESSURE)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE  FLOW =        9.29 CFS           PIPE DIAMETER =  18.00  INCHES
  FLOW  VELOCITY =    5.26  FEET/SEC.    VELOCITY HEAD =  0.429  FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.429) =  0.086

  NODE    120.63  : HGL = <  562.804>;EGL= <  562.B04>;rLOWLINE= <  560.490>

****************************************    ***********************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    120.63             FLOWLINE ELEVATION =    560.49
  ASSUMED UPSTREAM CONTROL HGL =     561.67  FOR  DOWNSTREAM  RUN  ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW .ANALYSIS AT BASIN 12000 (NODE 12049 TO 12101 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *
****

FILE NAME: A:/12000R.PIP
TIME/DATE OF STUDY: 21:40 09/27/2004

****

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT}	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT}	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
120.49-	} FRICTION	0.61	22.93	0.46*	23.45
121.01-	} MANHOLE	0.54*Dc	22.38	0.54*Dc	22.38
121.01-		0.60*	22.73	0.54 De	22.38

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
CO§.RVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
DESIGN MANUALS.

****

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 120.49 FLOWLINE ELEVATION = 539.72
PIPE FLOW = 2.06 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 540.330 FEET

NODE 120.49 : **HGL** = < 540.176>;EGL= < 540.496>;FLOWLINE= < 539.720>

****

FLOW PROCESS FROM NODE 120.49 TO NODE 121.01 IS CODE = 1
UPSTREAM NODE 121.01 ELEVATION = 542.80 (FLOW IS SUPERCRITICAL}

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 2.06 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 319.78 FEET MANNING'S N 0.01300

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  NORMAL DEPTH(FT) =      0.45          CRITICAL DEPTH(FT) =      0.54
========================================    ================================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.54
=============================================================================  ==
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          0.541      3.583         0.741           22.38
         0.009          0.538      3.614         0.741           22.38
         0.039          0.534      3.646         0.741           22.39
         0.090          0.531      3.679         0.741           22.39
         0.165          0.528      3.712         0.742           22.41
         0.266          0.524      3.745         0.742           22.42
         0.396          0.521      3.779         0.743           22.44
         0.558          0.517      3.814         0.743           22.46
         0.756          0.514      3.849         0.744           22.48
         0.994          0.510      3.885         0.745           22.51
         1.277          0.507      3.921         0.746           22.54
         1.613          0.503      3.958         0.747           22.58
         2.008          0.500      3.996         0.748           22.61
         2.473          0.496      4.034         0.749           22.66
         3.018          0.493      4.073         0.751           22.70
         3.661          0.489      4.113         0.752           22.75
         4.422          0.486      4.154         0.754           22.81
         5.328          0.482      4.195         0.756           22.86
         6.419          0.479      4.237         0.758           22.93
         7.752          0.476      4.279         0.760           22.99
         9.415          0.472      4.323         0.762           23.06
        11.558          0.469      4.367         0.765           23.13
        14.460          0.465      4.412         0.768           23.21
        18.747          0.462      4.458         0.770           23.30
        26.430          0.458      4.505         0.773           23.38
       319.780          0.456      4.539         0.776           23.45
------------------------------------------------------------------------------
  NODE    121.01 : HGL = <  543.341>;EGL= <  543.541>;FLOWLINE= <  542.800>

**************************************************************   ***** *************
  FLOW PROCESS FROM NODE    121.01 TO NODE    121.01 IS CODE =  2
  UPSTREAM NODE   121.01      ELEVATION =   542,80   (FLOW IS SUBCRITICAL)

  CALCULATE MANHOLE LOSSES{LACFCD):
  PIPE FLOW =       2.06 CFS            PIPE DIAMETER    18.00 INCHES
  AVERAGED VELOCITY HEAD =  0.177 FEET
  HMN = .05*(AVERAGED VELOCITY HEAD) = .05*{ 0.177) =  0.009

  NODE    121.01 : HGL   <  543.395>;EGL=  <  543.550>;FLOWLINE=  <  542.800>

******** ***************************************************   **************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    121.01            FLOWLINE ELEVATION =    542.80
  ASSUMED UPSTREAM CONTROL HGL =     543.34 FOR DOWNSTREAM  RUN  ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
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**********************************************************************
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                      619-291-0707    Fax 619-291-4165

 ********** *************** DESCRIPTION OF STUDY *************************
  * McMILLIN OTAY RANCH VILLAGE 7                                J-14531A  *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12088 TO 6002 LATERAL)*
  * 50-YR STORM EVENT, ULTIMATE CONDITION                        BY:PT  *
  **********k*************************************************************

  FILE NAME: A:/12000H.PIP
  TIME/DATE OF STUDY: 16:43 09/27/2004

**********************************************************************k*****
               GRADUALLY VARIED. FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                 (Note: II*n indicates nodal point data used.)
                      UPSTREAM RUN                  DOWNSTREAM RUN
   NODE    MODEL     PRESSURE      PRESSURE+         FLOW         PRESSURE+
  NUMBER   PROCESS   HEAD(FT)   MOMENTUM(POUN DS)   DEPTH(FT)   MOMENTUM(POUNDS)
  120.88-              2.91*          645.68          1.28          474.99
        ) FRICTION         } HYDRAULIC JUMP
  120.89-              2.73           610.07          0.81*           738.23
        } MANHOLE
  120.89-              2.43           552.16          0.82*           731.23
        ) FRICTION
 6002.00-             l.64*Dc         438.06         l.64*Dc          438.06
        ) CATCH BASIN
 6002.00-            .2.72*           336.76         1.64 De          129.06

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**********************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   120.88          FLOWLINE ELEVATION =   531.19
  PIPE FLOW =      20.97 CFS      PIPE DIAMETER =  24.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   534.100 FEET
----------------------------------  ---------------- ,----------------------
  NODE   120.88 : HGL = <  534.lOO>;EGL= <  534.792>;FLOWLINE= <  531. 190>

******************k*****************************************************
  FLOW PROCESS fROM NODE   120.88 TO NODE   120.89 IS CODE =  1
  UPSTREAM NODE   120.89     ELEVATION =   532.42  (HYDRAULIC  JUMP  OCCURS)
```

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 20.97 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 122.01 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 1.52 CRITICAL DEPTH(FT) = 1.64

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.81

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.811	17.538	5.590	738.23
6.721	0.839	16.759	5.203	708.73
13.478	0.868	16.044	4.867	681.88
20.273	0.896	15.384	4.573	657.43
27.113	0.924	14.775	4.316	635.11
34.002	0.952	14.211	4.090	614.74
40.947	0.980	13.688	3.892	596.12
47.956	1.009	13.202	3.717	579.10
55.038	1.037	12.749	3.562	563.54
62.203	1.065	12.327	3.426	549.32
69.466	1.093	11.932	3.305	536.32
76.842	1.121	11.563	3.199	524.46
84.350	1.150	11.217	3.105	513.64
92.013	1.178	10.893	3.021	503.80
99.861	1.206	10.588	2.948	494.85
107.932	1.234	10.302	2.883	486.75
116.274	1.262	10.033	2.826	479.42
122.010	1.281	9.863	2.793	474.99

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD.(FT) = 2.91

PRESSURE FLOW PROF.ILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT}	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.910	6.675	3.602	645.68
122.010	2.728	6.675	3.420	610.07

----------END OF HYDRAULIC JUMP ANALYSIS----------

PRESSURE+MOMENTUM BALANCE OCCURS AT 89.63 FEET UPSTREAM OF NODE 120.88
DOWNSTREAM DEPTH = 2.777 FEET, UPSTREAM CONJUGATE DEPTH = 0.946 FEET

NODE 120.89 : **HGL** = < 533.231>;EGL= < 538.010>;FLOWLINE= < 532.420>

****

FLOW PROCESS FROM NODE 120.89 TO NODE 120.89 IS CODE 2
UPSTREAM NODE 120.89 ELEVATION = 532.75 (FLOW IS SUPERCRITICAL)

CALCULATE MANHOLE LOSSES(LACFCD):
PIPE FLOW = 20.97 CFS PIPE DIAMETER 24.00 INCHES
AVERAGED VELOCITY HEAD = 4.729 FEET
HMN = .05*(AVERAGED VELOCITY HEAD) = .05*(4.729) = 0.236

NODE 120.89 : **HGL** = < 533.568>;EGL= < 538.247>;FLOWLINE= < 532.750>

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

FLOW PROCESS FROM NODE 120.89 TO NODE 6002.00 IS CODE = 1
UPSTREAM NODE 6002.00 ELEVATION = 539.10 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 20.97 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 70.99 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.76 CRITICAL DEPTH(FT) = 1.64

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.64

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL (FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.641	7.601	2.538	438.06
0.022	1.605	7.756	2.540	438.36
0.089	1.570	7.922	2.545	439.26
0.208	1.535	8.100	2.555	440.81
0.382	1.500	8.293	2.569	443.02
0.621	1.465	8.499	2.588	445.95
0.931	1.430	8.720	2.612	449.63
1.322	1.395	8.958	2.642	454.11
1.806	1.360	9.214	2.679	459.45
2.397	1.325	9.488	2.724	465.71
3.112	1.290	9.784	2.777	472.95
3.972	1.255	10.102	2.841	481.26
5.003	1.220	10.444	2.915	490.73
6.239	1.185	10.814	3.002	501.44
7.720	1.150	11.214	3.104	513.53
9.503	1.115	11.646	3.222	527.11
11.659	1.080	12.116	3.361	542.33
14.288	1.045	12.626	3.522	559.38
17.531	1.010	13.183	3.710	578.43
21.596	0.975	13.790	3.930	599.74
26.806	0.940	14.456	4.187	623.56
33.704	0.905	15.188	4.489	650.21
43.315	0.870	15.995	4.845	680.07
57.940	0.835	16.888	5.266	713.59
70.990	0.818	17.354	5.497	731.23

NODE 6002.00 : **HGL** = < 540.740>;EGL= < 541.638>;FLOWLINE= < 539.100>

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

FLOW PROCESS FROM NODE 6002.00 TO NODE 6002.00 IS CODE = 8
UPSTREAM NODE 6002.00 ELEVATION = 539.10 (FLOW UNSEALS IN REACH)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 20.97 CFS PIPE DIAMETER = 24.00 INCHES
FLOW VELOCITY = 7.60 FEET/SEC. VELOCITY HEAD = 0.898 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.898) = 0.180

NODE 6002.00 : **HGL** = < 541.818>;EGL= < 541.818>;FLOWLINE= < 539.100>

```
** ********************************  ************************************+**
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  6002.00           FLOWLINE ELEVATION =   539.10
  ASSUMED UPSTREAM CONTROL HGL =    540.74 FOR DOWNSTREAM RUN ANALYSIS

==========;=================================================================
  END OF GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********

McMILLIN OTAY RANCH - VILLAGE 7 **J-14531-A**
PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12099 TO 12059 MAIN)
50-YR STORM EVENT, ULTIMATE CONDITION **BY:PT**

FILE NAME: A:/12000B.PIP
TIME/DATE OF STUDY: 18:56 09/27/2004

****

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.}

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS}	DOWNSTREAM RUN FLOW DEPTH(FT}	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
120.99-	) FRICTION	7.00	20489.34	3.74*	24303.85
120.86-	} JUNCTION	5.79 De	19297.54	3.76*	24167.09
120.86-	) FRICTION	5.55 De	19279.85	3.86*	23015.50
120.59-	) MANHOLE	5.55 De	19279.85	5.17*	19446.90
120.59-		5.55*Dc	19279.85	5.55*Dc	19279.85

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

****

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 120.99 FLOWLINE ELEVATION = 522.19
PIPE FLOW = 489.88 CFS PIPE DIAMETER = 84.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 529.190 FEET

NODE 120.99 : **HGL** = < 525.932>;EGL= < 534.436>;FLOWLINE= < 522.190>

****

FLOW PROCESS FROM NODE 120.99 TO NODE 120.86 IS CODE = 1
UPSTREAM NODE 120.86 ELEVATION = 523.79 (FLOW IS SUPERCRITICAL)

```
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          4B9.BB CFS      PIPE DIAMETER =  B4.00 INCHES
  PIPE LENGTH =       B0.23  FEET           MANNING'S  N      0.01300

  NORMAL  DEPTH(FT) =       3.68            CRITICAL  DEPTH(FT) =       5.79
==========  ================================================  =======  ====
  UPSTREAM  CONTROL  ASSUMED  FLOWDEPTH(FT)  =      3.76
================================================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE  FROM       FLOW  DEPTH   VELOCITY       SPECIFIC         PRESSURE+
   CONTROL(FT)             (FT)     (FT/SEC)      ENERGY(FT)     MOMENTUM(POUNDS)
          0.000           3.764      23.221           12.142          24167.09
         10.917           3.761      23.24 B          12.15B          241B8.14
         22.323           3.757      23.275           12.174          24209.27
         34.26            3.754      23.302           12.190          24230.46
         46.783           3.750      23.329           12.207          24251.72
         59.942           3.747      23.357           12.223          24273.05
         73.806           3.743      23.3B4           12.239          24294.44
         B0.230           3.742      23.396           12.246          24303.85

  NODE    120.86 : HGL = <  527.554>;EGL= <  535.932>;FLOWLINE=  <  523.790>

**************** ************************************************************
  FLOW  PROCESS  FROM  NODE    120.86 TO NODE    120.B6 IS CODE =  5
  UPSTREAM  NODE    120.B6      ELEVATION =    524.79   (FLOW IS SUPERCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE  CRITICAL     VELOCITY
                   (CFS)    (INCHES)  (DEGREES) ELEVATION   DEPTH (FT.)  (FT/SEC)
    UPSTREAM      456.24     72.00        0.00     524.79       5.55         23.7_ 51
    DOWNSTREAM    489.88     84.00                 523.79       5.79         23.22B
         LATERAL #1      33.64     36.00      BB.OD     527.79       1.8B          7.201
    LATERAL #2       0.00      0.00       0.00       0.00       0.00          0.000
       Q5            0.00===Q5 EQUALS BASIN INPUT=="'

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*V  l*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4)) /( (Al+A2)*16.l)+FRICTION  LOSSES
  UPSTREAM:     MANNING'S  N = 0.01300;  FRICTION  SLOPE = 0.02094
  DOWNSTREAM:   MANNING'S  N = 0.01300;  FRICTION  SLOPE = 0.01845
  AVERAGED  FRICTION  SLOPE  IN  JUNCTION  ASSUMED  AS  0.01969
  JUNCTION  LENGTH      8.00  FEET
  FRICTION LOSSES     0.158 FEET          ENTRANCE LOSSES     O.OQO FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 1.475)+( 0.000) =    1.475

  NODE    120.86 : HGL = <  528.647>;EGL= <  537.407>;FLOWLINE= <  524.790>

 ********************************************************************************
  FLOW PROCESS FROM NODE    120.B6 TO NODE    120.59  IS CODE =  1
  UPSTREAM NODE    120.59      ELEVATION =    540.37   (FLOW  IS  SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE E'LOW          456.24 CE'S      PIPE. DIAMETER =  72.00 INCHES
  PIPE LENGTH =      713.81 FEET           MANNING'S  N      0.01300
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 NORMAL DEPTH(FT) =      3.80          CRITICAL DEPTH(FT) =      5.55
====== ==========;================================================  =====
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =      5.17
================================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH   VELOCITY     SPECIFIC       PRESSORE+
  CONTROL(FT)          (FT)     (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
        0.000          5.170      17.604        9.985          19446.90
        2.887          5.115      17.761       10.017          19498.13
        6.251          5.060      17.926       10.053          19556.37
       10.129          5.006      18.097       10.094          19621.74
       14.564          4.951      18.276       10.141          19694.35
       19.606          4.896      18.462       10.193          19774.37
       25.315          4.842      18.656       10.250          19861.94
       31.760          4.787      18.858       10.312          19957.25
       39.023          4.732      19.067       10.381          20060.48
       47.203          4.678      19.285       10.456          20171.84
       56.417          4.623      19.511       10.538          20291.55
       66.810          4.568      19.746       10.626          20419.87
       78.557          4.513      19.990       10.722          20557.04
       91.878          4.459      20.243       10.826          20703.34
      107.049          4.404      20.505       10.937          20859.07
      124.428          4.349      20.778       11.057          21024.54
      144.486          4.295      21.060       11.186          21200.09
      167.863          4.240      21.353       11.325          21386.08
      195.456          4.185      21.658       11.473          21582.88
      228.579          4.131      21.974       11.633          21790.91
      269.274          4.076      22.302       11.804          22010.59
      320.960          4.021      22.642       11.987          22242.40
      390.049          3.966      22.996       12.183          22486.81
      490.955          3.912      23.363       12.392          22744.36
      669.920          3.857      23.744       12.617          23015.59
      713.810          3.857      23.744       12.617          23015.50
--------------------------------------------------------------------------------
 NODE    120.59 : HGL = <  545.540>;EGL= <  550.355>;FLOWLINE= <  540.370>

********.******************   ************************************************
 FLOW PROCESS FROM NODE    120.59 TO NODE    120.59 IS CODE =  2
 UPSTREAM NODE    120.59     ELEVATION =    540.70   (FLOW IS AT CRITICAL DEPTH)

 CALCULATE MANHOLE LOSSES(LACFCD):
 PIPE FLOW =     456.24 CFS            PIPE DIAMETER    72.00 INCHES
 AVERAGED VELOCITY HEAD =  4.331 FEET
 HMN = .05*(AVERAGED VELOCITY HEAD) = .05*(4.331)    0.217
 NOTE: ENERGY GRADE LINE HAS BEEN ADJUSTED DUE TO
       CHANGING IN FLOW LINE ELEVATIONS

 NODE    120.59 : HGL = <  546.252>;EGL= <  550.583>;FLOWLINE= <  540.700>

********************************************************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =    120.59           FLOWLINE ELEVATION =    540.70
 ASSUMED UPSTREAM CONTROL HGL =    546.25 FOR DOWNSTREAM RON ANALYSIS

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 END OF GRADUALLY VARIED FLOW ANALYSIS
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********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12058 TO 4002 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *
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FILE NAME: A:/12000L.PIP
TIME/DATE OF STUDY: 20:38 09/27/2004

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GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RON FLOW DEPTH{FT}	DOWNSTREAM RON PRESSURE+ MOMENTUM(POUNDS)
120.58-	) FRICTION	2.49*	199.22	0.38	40.63
4002.00-	) HYDRAULIC JUMP	0.6l*Dc	30.01	0.6l*Dc	30.01
4002.00-	) CATCH BASIN	0.88*	16.06	0.61 De	10.74

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, _AND OCEMA
DESIGN MANUALS.

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****************************** ****************************************** ****
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DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 120.58 FLOWLINE ELEVATION = 558.32
PIPE FLOW = 2.59 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 560.810 FEET

NODE 120.58 : **HGL** = < 560.B lO>;EGL= < 560.843>;FLOWLINE= < 558.320>

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****************"  ************************************************************
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FLOW PROCESS FROM NODE 120.58 TO NODE 4002.00 IS CODE = 1
UPSTREAM NODE 4002.00 ELEVATION = 560.90 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 2.59 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 74.39 FEET MANNING'S N 0.01300

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HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.37 CRITICAL DEPTH(FT) = 0.61

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.61

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT}	FLOW DEPTH (FT)	VELOCITY (FT/SEC}	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM{POUNDS)
0.000	0.610	3.838	0.839	30.01
0.010	0.600	3.921	0.839	30.02
0.042	0.591	4.007	0.840	30.06
0.099	0.581	4.096	0.842	30.13
0.182	0.571	4.189	0.844	30.22
0.295	0.562	4.287	0.847	30.34
0.441	0.552	4.388	0.851	30.49
0.626	0.542	4.495	0.856	30.67
0.852	0.533	4.606	0.862	30.89
1.128	0.523	4.722	0.869	31.13
1.459	0.513	4.843	0.878	31.42
1.854	0.504	4.971	0.888	31.74
2.324	0.494	5.104	0.899	32.10
2.881	0.484	5.245	0.912	32.50
3.542	0.475	5.392	0.927	32.95
4.329	0.465	5.547	0.943	33.45
5.269	0.455	5.711	0.962	33.99
6.400	0.446	5.883	0.984	34.58
7.776	0.436	6.065	1.008	35.24
9.474	0.427	6.257	1.035	35.95
11.617	0.417	6.460	1.065	36.72
14.408	0.407	6.675	1.099	37.56
18.229	0.398	6.903	1.138	38.48
23.937	0.388	7.146	1.181	39.48
34.287	0.378	7.403	1.230	40.56
74.390	0.378	7.421	1.233	40.63

HYDRAULIC JUMP: UPSTREAM RON ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 2.49

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL (FT)	PRESSURE HEAD(FT}	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	2.490	1.466	2.523	199.22
29.054	1.500	1.466	1.533	90.06

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT}	FLOW DEPTH (FT)	VELOCITY (FT/SEC}	SPECIFIC ENERGY (FT)	PRESSURE+ MOMENTUM(POUNDS)
29.054	1.500	1.465	1.533	90.06
30.086	1.464	1.474	1.498	86.19
31.106	1.429	1.491	1.463	82.39

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        32.118          1.393       1.513          1.429           78.67
        33.124          1.358       1.539          1.394           75.03
        34.123          1.322       1.570          1.360           71.49
        35.116          1.286       1.605          1.326           68.04
        36.102          1.251       1.645          1.293           64.69
        37.080          1.215       1.688          1.259           61.46
        38.050          1.180       1.737          1.226           58.34
        39.011          1.144       1.791          1.194           55.35
        39.961          1.108       1.850          1.161           52.49
        40.899          1.073       1.915          1.130           49.75
        41.823          1.037       1.986          1.098           47.16
        42.731          1.002       2.065          1.068           44.72
        43.620          0.966       2.152          1.038           42.43
        44.485          0.930       2.249          1.009           40.30
        45.323          0.895       2.355          0.981           38.33
        46.128          0.859       2.474          0.954           36.54
        46.890          0.823       2.606          0.929           34.94
        47.602          0.788       2.753          0.906           33.53
        48.249          0.752       2.919          0.885           32.33
        48.813          0.717       3.106          0.867           31.36
        49.271          0.681       3.318          0.852           30.63
        49.585          0.645       3.560          0.842           30.17
        49.705          0.610       3.838          0.839           30.01
        74.390          0.610       3.838          0.839           30.01
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
1  PRESSURE+MOMENTUM  BALANCE OCCURS AT    44.57 FEET UPSTREAM OF NODE  120.58 |
|        DOWNSTREAM  DEPTH = 0.927 FEET, UPSTREAM CONJUGATE DEPTH = 0.382 FEET  |

  NODE   4002.00 : HGL = <  561.510>;EGL= <  561.739>;FLOWLINE= <  560.900>

 ****************************************************************************
  FLOW PROCtss FROM NODE  4002.00 TO NODE  4002.00 IS CODE =  8
  UPSTREAM NODE  4002.00     ELEVATION =   560.90   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       2.59 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  3.84  FEET/SEC.  VELOCITY  HEAD =  0.229 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*{  0.229) =  0.046

  NODE   4002.00 : HGL = <  561.785>;EGL= <  561.785>;FLOWLINE= <  560.900>

******** ************ ********************************************  **********
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  4002.00            FLOWLINE ELEVATION =   560.90
  ASSUMED UPSTREAM CONTROL HGL =    561.51 FOR DOWNSTREAM RUN ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
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                            Analysis prepared by:

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                           San Diego, California 92110
                          619-291-0707    Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* McMILLIN OTAY RANCH VILLAGE 7                                 J-14531A *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12062 TO 12068 LATERAL) *
* 50-YR STORM EVENT, ULTIMATE CONDITION                           B:PT   *
 ************************************************************************

  FILE NAME: A:/12000P.PIP
  TIME/DATE OF STUDY: 20:24 09/27/2004

**************************************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
              (Note: "*" indicates nodal point data used.)
                    UPSTREAM RUN                  DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+        FLOW        PRESSURE+
  NUMBER  PROCESS  HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
  120.62-             1.36*          81.57         0.49            53.21
        ) FRICTION         ) HYDRAULIC JUMP
  120.68-             0.7l*Dc        44.08         0.7l*Dc         44.08
        } CATCH BASIN
  120.68-             1.04*          23.79         0.71 De         15.55

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD, LACFCD, AND OCEMA
 DESIGN MANUALS.
**************************************************************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   120.62          FLOWLINE ELEVATION =   559.64
 PIPE FLOW =      3.49 CFS       PIPE DIAMETER =  18.00  INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   561.000 FEET

 NODE   120.62 : HGL = <  561.000>;EGL= <  561.067>;FLOWLINE= <  559.640>

 ***************.******************************************************
 FLOW PROCESS FROM NODE   120.62 TO NODE   120.68 IS CODE =  1
 UPSTREAM NODE   120.68    ELEVATION =   561.00   (HYDRAULIC JUMP OCCURS)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          3.49 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =     62.04 FEET          MANNING'S N     0.01300
```

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.48 CRITICAL DEPTH(FT) = 0.71

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.71

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT}	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.713	4.216	0.989	44.08
0.014	0.703	4.287	0.989	44.09
0.058	0.694	4.361	0.990	44.13
0.134	0.685	4.437	0.991	44.19
0.247	0.676	4.516	0.993	44.27
0.400	0.667	4.598	0.995	44.39
0.598	0.658	4.682	0.998	44.53
0.846	0.648	4.769	1.002	44.69
1.150	0.639	4.860	1.006	44.89
1.518	0.630	4.954	1.011	45.12
1.958	0.621	5..051	1.017	45.38
2.481	0.612	5.153	1.024	45.67
3.100	0.602	5.258	1.032	46.00
3.832	0.593	5..367	1.041	46.36
4.697	0.584	5.480	1.051	46.76
5.721	0.575	5.598	1.062	47.19
6.939	0.566	5.721	1.074	47.67
8.399	0.556	5.849	1.088	48.19
10.166	0.547	5.982	1.103	48.75
12.337	0.538	6.121	1.120	49.36
15.063	0.529	6.266	1.139	50.02
18.596	0.520	6.417	1.160	50.73
23.408	0.511	6.576	1.182	51.49
30.561	0.501	6.741	1.207	52.31
43.461	0.492	6.915	1.235	53.19
62.040	0.492	6.918	1.236	53.21

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.36

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT}	FLOW DEPTH (FT}	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.360	2.072	1.427	81.57
1.145	1.334	2.101	1.403	79.07
2.281	1.308	2.133	1.379	76.62
3.407	1.282	2.169	1.355	74.24
4.522	1.256	2.207	1.332	71.93
5.626	1.231	2.249	1.309	69.68
6.719	1.205	2.294	1.286	67.50
7.799	1.179	2.342	1.264	65.39
8.866	1.153	2.394	1.242	63.36
9.917	1.127	2.450	1.220	61.41
10.953	1.101	2.510	1.199	59.54
11.969	1.075	2.574	1.178	57.76

```
         12.965          1.049      2.643          1.158           56.06
         13.938          1.023      2.717          1.138           54.46
         14.885          0.997      2.796          1.119           52.95
         15.802          0.972      2.881          1.101           51.54
         16.685          0.946      2.973          1.083           50.23
         17.529          0.920      3.071          1.066           49.03
         18.327          0.894      3.177          1.051           47.94
         19.071          0.868      3.292          1.036           46.98
         19.752          0.842      3.416          1.023           46.13
         20.358          0.816      3.550          1.012           45.42
         20.873          0.790      3.696          1.003           44.85
         21.279          0.764      3.854          0.995           44.43
         21.548          0.739      4.027          0.991           44.17
         21.648          0.713      4.216          0.989           44.08
         62.040          0.713      4.216          0.989           44.08
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
| PRESSURE+MOMENTUM BALANCE OCCURS AT    14.73 FEET UPSTREAM OF NODE  120.62 |
       DOWNSTREAM DEPTH = 1.002 FEET, UPSTREAM CONJUGATE DEPTH = 0.492 FEET |

  NODE    120.68 : HGL = <  561.713>;EGL= <  561.989>;FLOWLINE=  <  561.000>

************************************************************   ************* **
  FLOW PROCESS FROM NODE   120.68 TO NODE   120.68 IS CODE =  8
  UPSTREAM NODE   120.68     ELEVATION =   561.00   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD}:
  PIPE FLOW =       3.49 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  4.22 FEET/SEC.  VELOCITY HEAD =  0.276 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.276) =  0.055

  NODE    120.68 : HGL =  <  562.044>;EGL=  <  562.044>;FLOWLINE=  <  561.000>

*************** ******************************************************   ******
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   120.68           FLOWLINE ELEVATION =   561.00
  ASSUMED UPSTREAM CONTROL HGL =    561.71 FOR DOWNSTREAM RUN ANALYSIS

===============;=================================== =; =  ==============
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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**************************************************************************
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              Ver. 8.0  Release Date: 01/01/2003  License ID 1261

                            Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                            San Diego, California 92110
                          619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
  * McMILLIN OTAY RANCH VILLAGE 7                                J-14531A *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12088 TO 7002 LATERAL)*
  * 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT *
 ************************************************************************

  FILE NAME: A:/12000Y.PIP
  TIME/DATE OF STUDY:  19:09 09/27/2004

**************************************************************************
                GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                          NODAL POINT STATUS TABLE
                    (Note: "*" indicates nodal point data used.)
                          UPSTREAM RUN                    DOWNSTREAM  RUN
    NODE      MODEL     PRESSURE       PRESSURE+          FLOW          PRESSURE+
   NUMBER   PROCESS   HEAD(FT)    MOMENTUM(POUNDS)    DEPTH (FT)   MOMENTUM(POUNDS)
   120.88-               1.80 De 620.50                   1.62*             631.59
         } FRICTION
  7002.00-               l.80*Dc          620.50         l.80*Dc           620.50
         ▌CATCH BASIN
  7002.00-               3.29*            449.74         1.80 De           157.85

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD, LACFCD, AND OCEMA
  DESIGN MANUALS.
**************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   120.88           FLOWLINE ELEVATION =  531.19
  PIPE FLOW =      26.67 CFS      PIPE DIAMETER =   24.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   532.780 FEET
  *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(   1.59 FT.)
         IS LESS THAN CRITICAL DEPTH(  1.80 FT.)
  ===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
       FOR UPSTREAM RUN ANALYSIS

  NODE    120.88 : HGL = <  532.807>;EGL= <  534.299>;FLOWLINE= <  531.190>

**************************************************************************
  FLOW PROCESS FROM NODE   120.88 TO NODE   7002.00 IS CODE =  l
  UPSTREAM NODE  7002.00     ELEVATION =   532.50  (FLOW IS SUPERCRITICAL)
```

```
  CALCULATE FRICTION LOSSES(LACFCD}:
  PIPE FLOW          26.67 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =      90.62 FEET          MANNING'S N0.01300

  NORMAL DEPTH(FT) =      1. 61          CRITICAL DEPTH(FT) =      1.8 0
==========  ==========================   ==============%====================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH (FT) =     1.80
====;========;=======  ====================  ==================================
  GRADUALLY VARIED FLOW PROFILE. COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)           (FT)    (FT/SEC)     ENERGY (FT)    MOMENTUM(POUNDS)
          0.000          1.801      8.949          3.045          620.50
          0.048          1.793      8.977          3.045          620.52
          0.196          1.785      9.007          3.046          620.58
          0.449          1.778      9.036          3.046          620.67
          0.813          1.770      9.067          3.047          620.81
          1.298          1.762      9.098          3.048          620.99
          1.911          1.754      9.130          3.049          621.21
          2.664          1.746      9.162          3.051          621.46
          3.571          1.738      9.196          3.052          621.76
          4.647          1.731      9.230          3.054          622.09
          5.912          1.723      9.264          3.056          622.47
          7.388          1.715      9299           3.058          622.88
          9.106          1.707      9.335          3.061          623.34
         11.101          1.699      9.372          3.064          623.84
         13.418          1.691      9.409          3.067          624.37
         16.116          1.683      9.447          3.070          624.95
         19.274          1.676      9.486          3.074          625.57
         22.997          1.668      9.525          3.077          626.24
         27.433          1.660      9.565          3.082          626.94
         32.800          1.652      9.606          3.086          627.69
         39.434          1.644      9.647          3.090          628.48
         47.902          1.636      9.689          3.095          629.31
         59.264          1.629      9.732          3.100          630.19
         75.902          1.621      9.776          3.106          631.11
         90.620          1.617      9.798          3.109          631.59
-------------------------------------------------------------------------------
  NODE   7002.00 : HGL = <  534.30l>;EGL= <  535.545>;FLOWLINE= <  532.500>

*************************   ************************************************
  FLOW PROCESS FROM NODE  7002.00 TO NODE  7002.00 IS CODE =  8
  UPSTREAM NODE  7002 .00     ELEVATION =   532.50   (FLOW UNSEALS IN REACH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       26.67 CFS        PIPE DIAMETER =  24.00 INCHES
  FLOW VELOCITY = 8 .95 FEET/SEC.   VELOCITY HEAD =  1.244 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  1.244) =  0.249

  NODE   7002.00 : HGL = <  535.794>;EGL= <  535.794>;FLOWLINE= <  532.500>

..**********  * * ***** *** ************************ **k****** ***** **** ****** *
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  7002.00          FLOWLINE ELEVATION =   532.50
  ASSUMED UPSTREAM CONTROL HGL =    534.30 FOR DOWNSTREAM RUN ANALYSIS

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END OF GRADUALLY VARIED FLOW ANALYSIS

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**************************************************************************
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                          Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                            San Diego, Califorriia 92110
                          619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
  * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A *
 * PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 1205 TO 12051 LATERAL) *
* 50-YR STORM EVENT, ULTIMATE CONDITION                             BY:PT   *
 **************************************************************************

  FILE NAME: A:/12000J.PIP
  TIME/DATE OF STUDY: 20:45 09/27/2004

**************************    ************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                     UPSTREAM RUN                    DOWNSTREAM RUN
   NODE    MODEL     PRESSURE      PRESSURE+          FLOW        PRESSURE+
  NUMBER   PROCESS   HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
  120.50-              1.94*          143.16         0.45          52.84
        } FRICTION
  120.51-              1.51*           96.21         0.69 De            41.00
        } CATCH BASIN
  120.51-              1.58*           91.43         0.69 De            14.51

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
******** ************************************************  **********
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   120.50          FLOWLINE ELEVATION =   546.00
 PIPE FLOW =      3.30 CFS       PIPE DIAMETER =  18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =  547.940 FEET

 NODE   120.50 : HGL = <  547.940>;EGL=<  547.994>;FLOWLINE=<  546.000>

************************************************************************ **********
 FLOW PROCESS FROM NODE   120.50 TO NODE   120.51 IS CODE =  1
 UPSTREAM NODE   120.51    ELEVATION =   546.43   (FLOW IS UNDER PRESSURE)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          3.30 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH        4.25 FEET          MANNING'S N     0.01300
 SF=(Q/K)**2   ((     3.30)/(   104.832))**2 = 0.00099
```

```
  HF=L*SF =  (      4.25)*(0.00099) =      0.004

  NODE    120.51 : HGL = <  547.944>;EGL= <  547.998>;FLOWLINE= <  546.430>

****************************************    ******************************
  FLOW PROCESS FROM NODE    120.51 TO NODE    120.51 IS CODE =  8
  UPSTREAM NODE    120.51     ELEVATION =    546.43   (FLOW IS UNDER PRESSURE)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       3.30 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY  =   1.87  FEET/SEC.   VELOCITY  HEAD  =  0.054 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.054) =  0.011

  NODE    120.51 : HGL = <  548.009>;EGL=  <  548.009>;FLOWLINE=  <  546.430>

****************************************************************************
  UP?TREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    120.51            FLOWLINE ELEVATION =    546.43
  ASSUMED UPSTREAM CONTROL HGL =     547.12 FOR DOWNSTREAM RUN ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared by:

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San Diego, California 92110
619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12050 TO 12054 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *

FILE NAME: A:/12000K.PIP
TIME/DATE OF STUDY: 20:48 09/27/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
120.50-		1.94*	153.03	0.60	69.01
	FRICTION				
120.54-		1.49*	103.81	0.81 De	60.62
	CATCH BASIN				
120.54-		1.61*	95.09	0.81 De	21.04

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 120.50 FLOWLINE ELEVATION = 546.00
PIPE FLOW = 4.46 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 547.940 FEET

NODE 120.50 : **HGL** = < 547.940>;EGL= < 548.039>;FLOWLINE= < 546.000>

FLOW PROCESS FROM NODE 120.50 TO NODE 120.54 IS CODE = 1
.UPSTRE:AM NODE 120.54 ELEVATION = 546.49 (FLOW SEALS IN REACH)

CALCULATE FRICTION LOSSES(LACFCD}:
PIPE FLOW 4.46 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 24.25 FEET MANNING'S N 0.01300

```
  DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =    1.94
=======  ==========================================  =%====================
  PRESSURE FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       PRESSURE    VELOCITY      SPECH'IC        PRESSURE+
   CONTROL(FT)        HEAD{FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
          0.000          1.940       2.524          2.039           153.03
         23.909          1.500       2.524          1.599           104.52

  NORMAL DEPTH(FT) =      0.56           CRITICAL DEPTH(FT) =      0.81
=====================  ================================================   F
  ASSUMED DOWNSTREAM PRESSURE HEAD{FT) =     1.50

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)           (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM (POUNDS)
         23.909          1.500       2.523          1.599           104.52
         24.250          1.493       2.524          1.593           103.81

  NODE    120.54 : HGL = <  547.983>;EGL= <  548.083>;FLOWLINE= <  546.490>

**********************************************************k*****************
  FLOW PROCESS FROM NODE    120.54 TO NODE    120.54 IS CODE =  8
  UPSTREAM NODE   120.54     ELEVATION =   546.49   (FLOW UNSEALS IN REACH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       4.46 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  2.52 FEET/SEC.  VELOCITY HEAD =  0.099 fEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.099) =  0.020

  NODE    120.54 : HGL = <  548.102>;EGL= <  548.102>;FLOWLINE= <  546.490>

 ************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    120.54           FLOWLINE ELEVATION =   546.49
  ASSUMED UPSTREAM CONTROL HGL =    547.30 FOR DOWNSTREAM RUN ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
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Analysis prepared by:

RICK ENGINEERING COMPANY
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San Diego, California 92110
619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-l4531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12042 TO 12043 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *

FILE NAME: A:/12000M.PIP
TIME/DATE OF STUDY: 20:52 09/27/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: n*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
120.42-	FRICTION	0.99 De	100.65	0.68*	121.09
120.43-	CATCH BASIN	0.99*Dc	100.65	0.99*Dc	100.65
120.43-		1.51*	84.05	0.99 *De*	33.45

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 120.42 FLOWLINE ELEVATION = 536.44
PIPE FLOW = -6.55 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HG** = 537.130 FEET
*NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(0.69 FT.)
IS LESS THAN CRITICAL DEPTH(0.99 FT.)
==> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
FOR UPSTREAM RUN ANALYSIS

NODE 120.42 : **HGL** = < 537.117>;EGL= < 538.227>;FLOWLINE= < 536.440>

FLOW PROCESS FROM NODE 120.42 TO NODE 120.43 IS CODE = 1
UPSTREAM NODE 120.43 ELEVATION = 536.87 (FLOW IS SUPERCRITICAL)

```
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW            6.55 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =        4.25 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =       0.45           CRITICAL DEPTH(FT) =      0.99
================ ============================================================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.99
=============== ================ ==  ========================== ==============
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------      ----
  DISTANCE FROM       FLOW  DEPTH   VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)           (FT)     (FT/SEC)     ENERGY(FT)     MOMENTUM( POUNDS)
         0.000          0.990       5.293          1.425            100.65
         0.010          0.968       5.428          1.426            100.72
         0.042          0.947       5.572          1.429            100.94
         0.098          0.925       5.724          1.434            101.32
         0.181          0.904       5.887          1.442            101.86
         0.295          0.882       6.060          1.453            102.59
         0.445          0.860       6.245          1.466            103.50
         0.635          0.839       6.442          1.484            104.61
         0.872          0.817       6.653          1.505            105.94
         1.163          0.796       6.878          1.531            107.50
         1.516          0.774       7.120          1.562            109.31
         1.944          0.752       7.380          1.599            111.39
         2.458          0.731       7.660          1.642            113.77
         3.077          0.709       7.961          1.694            116.46
         3.823          0.688       8.286          1.755            119.51
         4.250          0.677       8.450          1.787            121.09

  NODE    120.43 : HGL = <  537.860>;EGL= <  538.295>;FLOWLINE= <  536.870>

****************************************************************************
  FLOW PROCESS FROM NODE    120.43 TO NODE    120.43 IS CODE =  8
  UPSTREAM NODE   120.43     ELEVATION =   536.87  (FLOW UNSEALS IN REACH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =        6.55 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =   5.30 FEET/SEC.    VELOCITY HEAD =  0.435 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.435) =  0.087

  NODE    120.43 : HGL = <  538.382>;EGL= <  538.382>;FLOWLINE= <  536.870>

****************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   120.43           FLOWLINE ELEVATION =   536.87
  ASSUMED UPSTREAM CONTROL HGL =    537.86 FOR DOWNSTREAM RUN ANALYSIS

================================================================================
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                           San Diego, California 92110
                          619-291-0707    Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12042 TO 12046 LATERAL) *
* 50-YR STORM EVENT, ULTIMATE CONDITION                           BY:PT   *
 ************************************************************************

  FILE NAME: A:/12000I.PIP
  TIME/DATE OF STUDY: 20:54 09/27/2004

**************************************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                     UPSTREAM RUN                  DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+        FLOW        PRESSURE+
  NUMBER   PROCESS   HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
  120.42-             0.75 De          49.55        0.55*            56.51
        ) FRICTION
  120.46-             0.75*Dc          49.55        0.75*Dc          49.55
        } CATCH BASIN
  120.46-             1.10*            26.86        0.75 De          17.39

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**************************************************************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =    120.42          FLOWLINE ELEVATION =  536.44
 PIPE FLOW =      3.82 CFS       PIPE DIAMETER =   18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   537.130 FEET
 *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(  0.69 FT.)
        IS LESS THAN CRITICAL DEPTH(  0.75 fT.)
 ==> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
      FOR UPSTREAM RUN ANALYSIS

 NODE   120.42 : HGL = <  536.990>;EGL= <  537.646>;FLOWLINE= <  536.440>

**************************** ************************** *********************
 FLOW PROCESS FROM NODE   120.42 TO NODE   120.46 IS CODE =  1
 UPSTREAM NODE   120.46     ELEVATION =   536.88   (FLOW IS SUERCRITICAL)
```

```
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          3.82 CFS       PIPE DIAMETER =  18.00  INCHES
  PIPE LENGTH =      21.78 E"'EET          MANNING'S N0.01300

  NORMAL DEPTH(FT) =      0.52           CRITICAL DEPTH(FT) =      0.75
======  =-====================  ============================== ============
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.75
================================ ============================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
--------------------------------------------------------------------------
  DISTANCE  FROM      FLOW DEPTH  VELOCITY     SPECIFIC        PRESSURE+
   CONTROL(FT}           (FT)    (FT/SEC)     ENERGY(FT}    MOMENTUM(POUNDS)
         0.000          0.747      4.343          1.040           49.55
         0.015          0.738      4.412          1.04.0          49.57
         0.062          0.729      4.484          1.041           49.60
         0.144          0.720      4.557          1.042           49.66
         0.264          0.710      4.634          1.044           49.75
         0.4.28         0.701      4.712          1.046           49.86
         0.639          0.692      4.793          1.049           50.01
         0.903          0.683      4.878          1.052           50.18
         1.227          0.674      4.965          1.057           50.37
         1.618          0.664      5.055          1.061           50.60
         2.087          0.655      5.148          1.067           50.87
         2.643          0.646      5.244          1.073           51.16
         3.301          0.637      5.344          1.081           51.49
         4.079          0.628      5.448          1.089           51.85
         4.996          0.619      5.556          1.098           52.25
         6.083          0.609      5.668          1.108           52.69
         7.374          0.600      5.784          1.120           53.16
         8.920          0.591      5.904          1.133           53.68
        10.790          0.582      6.030          1.147           54.24
        13.087          0.573      6.160          1.162           54.85
        15.968          0.563      6.296          1.179           55.50
        19.699          0.554      6.437          1.198           56.21
        21.780          0.550      6.497          1.206           56.51
--------------------------------------------------------------------------
  NODE    120.46 : HGL = <  537.627>;EGL= <  537.920>;FLOWLINE= <  536.880>

******************************** ********************** **********************
  FLOW PROCESS FROM NODE   120.46 TO NODE   120.46 IS CODE =  8
  UPSTREAM NODE   120.46     ELEVATION =   536.88  (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD}:
  PIPE FLOW =        3.82 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  4.34 E"'EET/ SEC.  VELOCITY HEAD =  0.293 E"'EET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.293) =  0.059

  NODE    120.46 : HGL = <  537.979>;EGL= <  537.979>;FLOWLINE= <  536.880>

**************************   ***********************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   120.46          FLOWLINE ELEVATION =   536.88
  ASSUMED UPSTREAM CONTROL HGL =    537.63 FOR DOWNSTREAM RUN ANALYSIS

=====  ====-=-==========-=====  ======-=-======-==========  ====-=-=====-=====
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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********************************************************** ******************
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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
  * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12080 TO 12081 LATERAL) *
 * 50-YR STORM EVENT, ULTIMATE CONDITION                            BY:PT   *
  **************************************************************************

   FILE NAME: A:/12000E.PIP
   TIME/DATE OF STUDY: 21:00 09/27/2004

********** ********** ********** ********** ********** k *** ** * * ****
                GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                          NODAL POINT STATUS TABLE
                    (Note: "*" indicates nodal point data used.)
                          UPSTREAM RUN                    DOWNSTREAM RUN
    NODE    MODEL     PRESSURE       PRESSURE+          FLOW          PRESSURE+
   NUMBER   PROCESS   HEAD (FT)    MOMENTUM( POUNDS)   DEPTH(FT)    MOMENTUM(POUNDS)
   120.80-                0.24 De             3.07         0.09*         9.03
         )FRICTION
         120.81-               0.24*Dc              3.07         0.24*Dc             3.07
         ) CATCH BASIN
         120.81-               0.34*                1.62         0.24 De             1.14

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    120.80            FLOWLINE ELEVATION =    530.26
  PIPE FLOW =        0.43 CFS        PIPE DIAMETER =  18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =  530.260 FEET
  *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(   0.00 FT.)
         IS LESS THAN CRITICAL DEPTH(   0.24 FT.)
  ===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
       FOR UPSTREAM RUN ANALYSIS

  NODE    120.80 : HGL = <  530.345>;EGL= <  532.132>;FLOWLINE= <  530.260>

**************************************************************************
  FLOW PROCESS FROM NODE    120.80 TO NODE    120.81 IS CODE =  1
  UPSTREAM NODE   120.81     ELEVATION =    536.13   (FLOW IS SUPERCRITICAL}
```

```
  CALCULATE FRICTION LOSSES(LACFCD ):
  PIPE FLOW          0.43 CFS      PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =      10.25 FEET          MANNING'S N0.01300

  NORMAL DEPTH(FT) =      0.08           CRITICAL DEPTH(FT) =      0.24
=======================================================   ================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.24
======================  ================  ===============  ==================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       FLOW DEPTH   VELOCITY     SPECIE'IC        PRESSURE+
   CONTROL(FT)            (FT)    (FT/SEC)     ENERGY(FT)    MOMENTOM(POUNDS)
          0.000          0.242       2.323          0.326              3.07
          0.001          0.236       2.416          0.327              3 .08
          0.003          0.229       2.516          0.328              3.09
          0.006          0.223       2.624          0.330              3.11
          0.012          0.216       2.739          0.333              3.14
          0.020          0.210       2.864          0.337              3.18
          0.030          0.203       2.999          0.343              3.24
          0.043          0.197       3.144          0.350              3.30
          0.060          0.190       3.303          0.360              3.38
          0.081          0.184       3.475          0.371              3.47
          0.106          0.177       3.664          0.386              3.58
          0.138          0.171       3.871          0.403              3.70
          0.178          0.164       4.098          0.425              3.85
          0.226          0.158       4.349          0.451              4.02
          0.286          0.151       4.627          0.484              4.21
          0.361          0.145       4..937         0.523              4.43
          0.454          0.138       5.283          0.572              4 .69
          0.571          0.131       5.673          0:632              4.98
          O.720          0.125       6.115          0.706              5.32
          0.914          0.118       6.618          0.799              5.71
          1.172          0.112       7.195          0.916              6.17
          1.527          0.105       7.862          1.066              6.70
          2.042          0.099       8.641          1.259              7.33
          2.859          0.092       9.559          1.512              8 .07
          4.435          0.086      10.655          1.850              8.97
         10.250          0.085      10.724          1.872              9.03
-----------------------    ---------------------------------- -----------------
  NODE    120.81 : HGL = <  536.372>;EGL= <  536.456>;FLOWLINE= <  536.130>

**************************************************** **********************
  FLOW PROCESS FROM NODE   120.81 TO NODE   120.81 IS CODE =  8
  UPSTREAM NODE   120.81     ELEVATION =   536.13  (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       0.43 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY = 2 .32 FEET/SEC.   VELOCITY HEAD =  0.084 FEET
  CATCH BASIN ENERGY LOSS = .2*{VELOCITY HEADl = .2*(  0.084) =  0.017

  NODE   120.81 : HGL = <  536.473>;EGL= <  536.473>;FLOWLINE= <  536.130>

**************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER ;   120.81          FLOWLINE ELEVATION =   536.13
  ASSUMED UPSTREAM CONTROL HGL =    536.37 FOR DOWNSTREAM RON ANALYSIS
```

END OF GRADUALLY VARIED FLOW ANALYSIS

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Analysis prepared by:

RICK ENGINEERING COMPANY
5620 friars Road
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619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12080 TO 12083 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *

FILE NAME: A:/12000F.PIP
TIME/DATE OF STUDY: 21:03 09/27/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
120.80-	} FRICTION	0.73 De	46.71	0.54*	53.46
120.83-	} CATCH BASIN	0.73*Dc	46.71	0.73*Dc	46.71
120.83-		1.07*	25.26	0.73 De	16.44

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 120.80 FLOWLINE ELEVATION = 530.26
PIPE FLOW = 3.65 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 530.260 FEET
*NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(0.00 FT.)
IS LESS THAN CRITICAL DEPTH(0.73 FT.)
===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
FOR UPSTREAM RON ANALYSIS

NODE 120.80 : **HGL** = < 530.795>;EGL= < 531.44l>;FLOWLINE= < 530.260>

FLOW PROCESS FROM NODE 120.80 TO NODE 129.83 IS CODE = 1
UPSTREAM NODE 120.83 ELEVATION = 530.71 (FLOW IS SUPERCRITICAL)

```
  CALCULATE FRICTION LOSSES(LACFCD}:
  PIPE FLOW          3.65 CFS       PIPE DIAMETER    18.00 INCHES
  PIPE LENGTH =      22.25 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      0.51           CRITICAL DEPTH(FT) =      0.73
=============================    ============ ======================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.73
============================ ================== ============== ==========
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
------------ ------------------------------------------------------------ ---
  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)           (FT}    (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS}
          0.000          0.730      4.278         1.014            46.71
          0.015          0.721      4.347         1.014            46.72
          0.060          0.712      4.418         1.015            46.76
          0.140          0.703      4.491         1.016            46.82
          0.257          0.694      4.566         1.018            46.90
          0.417          0.685      4.644         1.020            47.01
          0.622          0.676      4.725         1.023            47.14
          0.879          0.667      4.809         1.026            47.30
          1.195          0.658      4.895         1.030            47.49
          1.576          0.649      4.984         1.035            47.71
          2.033          0.640      5.077         1.040            47.96
          2.575          0.631      5.172         1.046            48.24
          3.216          0.622      5.272         1.054            48.55
          3.973          0.613      5.375         1.062            48.89
          4.867          0.604      5.481         1.071            49.27
          5.926          0.595      5.592         1.081            49.69
          7.184          0.586      5.707         1.092            50.14
          8.690          0.577      5.827         1.104            50.63
         10.511          0.568      5.951         1.118            51.16
         12.749          0.559      6.081         1.133            51.74
         15.555          0.550      6.216         1.150            52.36
         19.190          0.541      6.356         1.169            53.03
         22.250          0.535      6.446         1.181            53.46
-------------------------------------------------------------------------
  NODE    120.83 : HGL = <  531.440>;EGL= <  531.724>;FLOWLINE= <  530.710>

 ************************************************************************
  FLQW PROCESS FROM NODE    120.83 TO NODE    120.83 IS CODE =  8
  UPSTREAM NODE    120.83     ELEVATION =    530.71   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =         3.65 CFS         PIPE DIAMETER = 18.00 INCHES
  FLOW VELOCITY =   4.28 FEET/SEC .  VELOCITY HEAD = 0.284 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*( 0.284) = 0.057

  NODE    120.83 : HGL = <  531.781>;EGL= <  531.781>;FLOWLINE= <  530.710>

**************************************************** ***********************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    120.83            FLOWLINE ELEVATION =    530.71
  ASSUMED UPSTREAM CONTROL HGL =     531.44 FOR DOWNSTREAM RUN ANALYSIS

==== ===;===  ==========  ==========================;==========
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

```
**********************************************************************    ********
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                                   Analysis prepared by:

                                    RICK ENGINEERING COMPANY
                                        5620 Friars Road
                                     San Diego, California 92110
                                    619-291-0707    Fax 619-291-4165

  ************************** DESCRIPTION OF STUDY **************************
   * McMILLIN OTAY RANCH VILLAGE 7                                    J-14531A *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12060 TO 8000 LATERAL)    *
   * 50-YR STORM EVENT, ULTIMATE CONDITION                             BY:PT  *
  ************************************************    ******************

   FILE NAME: A:/12000G.PIP
   TIME/DATE OF STUDY: 21:18  09/27/2004

*****************************    ***********************************************
                  GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                             NODAL POINT STATUS TABLE
                   (Note: "*" indicates nodal point data used.)
                          UPSTREAM RUN                    DOWNSTREAM RUN
    NODE     MODEL     PRESSURE       PRESSURE+          FLOW          PRESSURE+
   NUMBER   PROCESS   HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOMENTUM(POUNDS)
   120.60-                3.61*             564.54         0.67              196.38
         1 FRICTION          } HYDRAULIC JUMP
  8002.00-                1.09*Dc           145.85         1.09*Dc           145.85
         } CATCH BASIN
  8002.00-                1.61*              79.84         1.09 De            50.58

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
 ***************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    120.60           FLOWLINE ELEVATION =    525.38
  PIPE FLOW =        9.26 CFS       PIPE DIAMETER =  24.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =    528.990 FEET

  NODE    120.60 : HGL = <  528.990>;EGL= <  529.125> FLOWLINE= <  525.380>

******* ******************  ************ ****************** ******************
  FLOW PROCESS FROM NODE    120.60 TO NODE   8002.00 IS CODE =  1
  UPSTREAM NODE  8002.00     ELEVATION =    528.00   (HYDRAULIC JUMP OCCURS)
----------------------------------------------------------------------------
  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW            9.26 CFS      PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =       82.35 FEET           MANNING'S N     0.01100
```

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.65 CRITICAL DEPTH(FT) = 1.09

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.09

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY {FT/SEC}	SPECIFIC ENERGY{FT}	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.087	5.308	1.524	145.85
0.021	1.069	5.415	1.525	145.91
0.085	1.052	5.528	1.527	146.09
0.198	1.035	5.645	1.530	146.39
0.366	1.017	5.767	1.534	146.83
0.594	1.000	5.895	1.540	147.40
0.889	0.982	6.029	1.547	148.11
1.261	0.965	6.169	1.556	148.97
1.719	0.948	6.315	1.567	149.99
2.275	0.930	6.468	1.580	151.17
2.943	0.913	6.629	1.596	152.52
3.741	0.895	6.798	1.613	154.05
4.689	0.878	6.975	1.634	155.77
5.816	0.860	7.161	1.657	157.69
7.153	0.843	7.357	1.684	159.82
8.744	0.826	7.564	1.715	162.18
10.646	0.808	7.781	1.749	164.77
12.936	0.791	8.011	1.788	167.62
15.724	0.773	8.254	1.832	170.74
19.169	0.756	8.511	1.881	174.15
23.517	0.739	8.783	1.937	177.87
29.185	0.721	9.071	2.000	181.92
36.949	0.704	9.378	2.070	186.33
48.560	0.686	9.704	2.149	191.13
69.629	0.669	10.051	2.239	196.34
82.350	0.669	10.053	2.239	196.38

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 3.61

PRESSURE FLOW PROfILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY (FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	3.610	2.948	3.745	564.54
53.417	2.000	2.948	2.135	248.93

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 2.00

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY (FT)	PRESSUR E+ MOMENTUM(POUNDS)
53.417	2.000	2.947	2.135	248.93
54.589	1.963	2.959	2.100	242.00
55.724	1.927	2.982	2.065	235.30

```
          56.837          1.890          3.011          2.031          228.79
          57.930          1.854          3.046          1.998          222.46
          59.005          1.817          3.087          1.965          216.31
          60.063          1.781          3.133          1.933          210.34
          61.104          1.744          3.184          1.902          204.58
          62.126          1.708          3.240          1.871          199.01
          63.129          1.671          3.301          1.841          193.66
          64.112          1.635          3.368          1.811          188.52
          65.072          1.598          3.440          1.782          183.61
          66.009          1.562          3.517          1.754          178.94
          66.920          1.525          3.601          1.727          174.52
          67.801          1.489          3.692          1.700          170.35
          68.650          1.452          3.789          1.675          166.46
          69.462          1.416          3.894          1.651          162.85
          70.232          1.379          4.007          1.628          159.53
          70.955          1.342          4.129          1.607          156.53
          71.624          1.306          4.260          1.588          153.85
          72.230          1.269          4.402          1.570          151.52
          72.763          1.233          4.555          1.555          149.56
          73.210          1.196          4.721          1.543          147.98
          73.557          1.160          4.900          1.533          146.82
          73.784          1.123          5.095          1.527          146.10
          73.866          1.087          5.308          1.524          145.85
          82.350          1.087          5.308          1.524          145.85
-------------------------END OF HYDRAULIC JUMP ANALYSIS------------ ------------
1  PRESSURE+MOMENTUM  BALANCE  OCCURS  AT     68.07  FEET  UPSTREAM  OF  NODE   120.60  1
I        DOWNSTREAM DEPTH = 1.477 FEET, UPSTREAM CONJUGATE DEPTH = 0.782 FEET I

  NODE   8002.00 : HGL = <   529.087>;EGL= <   529.524>;FLOWLINE= <   528.000>

****************************************************************************
  FLOW PROCESS FROM NODE   8002.00 TO NODE   8002.00 IS CODE =   8
  UPSTREAM NODE  8002.00     ELEVATION =    528.00   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =        9.26 CFS           PIPE DIAMETER =  24.00 INCHES
  FLOW  VELOCITY  =  5.31  FEET/SEC.   VELOCITY  HEAD  =  0.438 E'EET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD} = .2*(  0.438) =   0.088

  NODE   8002.00 : HGL  =  <   529.612>;EGL= <   529.612>;FLOWLINE= <   528.000>

****************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   8002.00              FLOWLINE ELEVATION =    528.00
  ASSUMED UPSTREAM CONTROL HGL =     529.09 FOR DOWNSTREAM RUN ANALYSIS

==========================================================================
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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**************************************************************************
                PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                        619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A  *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 12000 (NODE 12060 TO 5002 LATERAL)  *
* 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT     *
 ****************************************   ***********************.*********

  FILE NAME: A:/12000T.PIP
  TIME/DATE OF STUDY: 21:25 09/27/2004

**************************************************************************    **
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                      UPSTREAM RUN                    DOWNSTREAM RUN
   NODE    MODEL     PRESSURE      PRESSURE+          FLOW         PRESSURE+
  NUMBER   PROCESS   HEAD(FT)   MOMENTUM(POUNDS}.   DEPTH(FT)   MOMENTUM(POUNDS}
  120.60-              4.11          1252.42          0.99*      1339.82
        } FRICTION
 5002.00-             1.89*Dc         831.55         1.89*Dc        831.55
        } CATCH BASIN
 5002.00-             3.94*           577.16         1.89 De        175.24

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**************************************************************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   120.60          FLOWLINE ELEVATION =   524.88
 PIPE FLOW =      32.28 CFS      PIPE DIAMETER =  24.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL = 528.990 FEET

 NODE   120.60 : HGL = <  525.872>;EGL= <  532.568>;FLOWLINE= <  524.880>

 **************************************************************************
 FLOW PROCESS FROM NODE   120.60 TO NODE  5002.00 IS CODE =  1
 UPSTREAM NODE  5002.00     ELEVATION =   533.70  (FLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          32.28 CFS     PIPE DIAMETER =  24.00 INCHES
 PIPE LENGTH =      81.71 FEET          MANNING'S N     0.013000
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```
  NORMAL DEPTH(FT) =      0.92          CRITICAL DEPTH(FT) =      1.89
==================== ================= ============ ========================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.89
=========================================================  ====================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------------------------------------------------------------
  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)     (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          1.893     10.489         3.602           831.55
         0.043          1.854     10.619         3.606           832.30
         0.171          1.815     10.770         3.618           834.46
         0.383          1.776     10.942         3.637           838.00
         0.683          1.738     11.134         3.664           842.90
         1.077          1.699     11.345         3.699           849.18
         1.572          1.660     11.578         3.743           856.88
         2.180          1.621     11.831         3.796           866.04
         2.914          1.582     12.106         3.859           876.74
         3.791          1.543     12.405         3.934           889.06
         4.830          1.504     12.729         4.022           903.10
         6.058          1.466     13.080         4.124           918.97
         7.507          1.427     13.459         4.241           936.81
         9.216          1.388     13.870         4.377           956.77
        11.238          1.349     14.314         4.533           979.03
        13.640          1.310     14.795         4.711          1003.78
        16.511          1.271     15.318         4.917          1031.25
        19.974          1.232     15.885         5.153          1061.72
        24.203          1.194     16.501         5.424          1095.47
        29.452          1.155     17.173         5.737          1132.87
        36.119          1.116     17.907         6.098          1174.32
        44.872          1.077     18.710         6.516          1220.29
        56.969          1.038     19.591         7.002          1271.35
        75.237          0.999     20.561         7.568          1328.13
        81.710          0.992     20.760         7.688          1339.82
-------------------------------  ----------------------------------
  NODE   5002.00 : HGL = <  535.593>;EGL= <  537.302>;FLOWLINE= <  533.700>

 ************************************************************************
  FLOW PROCESS FROM NODE  5002.00 TO NODE  5002.00 IS CODE =  8
  UPSTREAM NODE  5002.00     ELEVATION =   533.70  (FLOW UNSEALS IN REACH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD);
  PIPE FLOW =      32.28 CFS          PIPE DIAMETER =  24.00 INCHES
  FLOW VELOCITY  = 10.49 FEET/SEC.  VELOCITY HEAD  =  1.709 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  1.709) =  0.342

  NODE   5002.00 : HGL = <  537.644>;EGL= <  537.644>;FLOWLINE= <  533.700>

***************** ***************************** *  *************************
  UPSTREAM PIP FLOW CONTROL DATA:
  NODE NUMBER =  5002.00          FLOWLINE ELEVATION     533.70
  ASSUMED UPSTREAM CONTROL HGL =    535.59 FOR DOWNSTREAM RUN ANALYSIS

==========================================================================
  END OF GRADUALLY VARIED FLOW ANALYSIS
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SYSTEM 13000

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

RICK ENGINEERING COMPANY
5620 Friars Road
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619-291-0707 Fax 619-291-4165

********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 13000 (NODE 13020 TO 13010 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY: PT** *

FILE NAME: A:/13000A.PIP
TIME/DATE OF STUDY: 09:56 09/23/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "ft*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
130.20-		1.32 De	236.78	0.93*	276.98
	} FRICTION				
130.10-		l.32*Dc	236.78	l.32*Dc	236.78
	} JUNCTION				
130.10-		1.93*	184.01	0.89	113.73
	} fRICTION		} HYDRAULIC JUMP		
130.09-		1.03 De	110.65	0.72*	130.26
	} MANHOLE				
130.09-		1.03 De	110.65	0.90*	113.40
	) FRICTION				
130.08-		1.03 De	110.65	0.72*	130.17
	} MANHOLE				
130.08-		1.03 De	110.65	0.90*	113.27
	} FRICTION				
130.04-		1.03*Dc	110.65	l.02*Dc	110.65
130.04-		1.48*	98.06	0.56	59.15
	) FRICTION				
130.07-		1.01*	59.15	0.76 De	52.10
	} CATCH BASIN				
130.07-		1.19*	42.74	0.76 De	18.24

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE .FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

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****************************    ***************** ******************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   130.20            FLOWLINE ELEVATION =   522.95
  PIPE FLOW =      13.37 CFS        PIPE DIAMETER =  24.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   523.720 FEET
  *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(  0.77 FT.)
         IS LESS THAN CRITICAL DEPTH(  1.32 FT.)
  ===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
       FOR UPSTREAM RUN ANALYSIS

  NODE   130.20 : HGL = <  523.881>;EGL= <  525.234>;FLOWLINE= <  522.950>

*********************************    ****************************************
  FLOW PROCESS FROM NODE   130.20 TO NODE   130.10 IS CODE =
  UPSTREAM NODE   130.10     ELEVATION =   524.50   (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          13.37 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH =      79.20 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT} =      0.91           CRITICAL DEPTH(FT) =      1.32
===================== ===================================== ==================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.32
=========================  ================== ============================ =
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW  DEPTH   VELOCITY      SPECIFIC        PRESSURE+
   CONTROL (FT)          (FT)     (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
         0.000          1.316       6.097          1.894           236.78
         0.030          1.300       6.185          1.894           236.83
         0.123          1.283       6.276          1.895           237.00
         0.285          1.267       6.370          1.897           237.28
         0.523          1.251       6.467          1.900           237.68
         0.846          1.234       6.568          1.905           238.20
         1.263          1.218       6.673          1.910           238.81)
         1.786          1.202       6.781          1.916           239.62
         2.426          1.185       6.893          1.923           240.54
         3.199          1.169       7.009          1.932           241.59
         4.124          1.152       7.130          1.942           242.79
         5.223          1.136       7.255          1.954           244.14
         6.524          1.120       7.385          1.967           245.64
         8.059          1.103       7.520          1.982           247.31
         9.871          1.087       7.661          1.999           249.15
        12.016          1.071       7.806          2.018           251.17
        14.566          1.054       7.958          2.038           253 37
        11.620          1.038       8.116          2.061           255.76
        21.315          1.022       8.280          2.087           258.36
        25.852          1.005       8.451          2.115           261.17
        31.547          0.989       8.630          2.146           264.20
        38.922          0.973       8.816          2.180           267.46
        48.964          0.956       9.010          2.218           270.96
        63.886          0.940       9.213          2.259           274.72
        79.200          0.931       9.333          2.284           276.98
-------------------------------------------------------------------------------
  NODE   130.10 : HGL = <  525.816>;EGL= <  526.394>;FLOWLINE= <  524.500>

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FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =  5
UPSTREAM NODE   130.10     ELEVATION =   524.75   (FLOW UNSEALS  IN REACH)

CALCULATE JUNCTION LOSSES:
     PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE   CRITICAL     VELOCITY
                 (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)  (FT/SEC)
   UPSTREAM       7.03     18.00       0.00     524.75       1.03        3.978
  DOWNSTREAM     13.37     24.00                524.50       1.32        6.099
  LATERAL #1      2.59     18.00      90.00     524.75       0.61        1.466
  LATERAL #2      3.75     18.00      90.00     524.75       0.74        2.122
     Q5           0.00===Q5 EQUALS BASIN INPUT===

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3}-
    Q4*V4*COS(DELTA4)}/((Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00448
DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00590
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00519
JUNCTION LENGTH     4.00 FEET
FRICTION LOSSES    0.021 FEET         ENTRANCE LOSSES    0.000 FEET
JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES   ( 0.529)+( 0.000) =   0.529

NODE   130.10 : HGL = <  526.677>;EGL= <  526.923>;FLOWLINE= <  524.750>

********************************************************************************
FLOW PROCESS FROM NODE   130.10 TO NODE   130.09 IS CODE =  1
UPSTREAM NODE   130.09     ELEVATION =   527.71   (HYDRAULIC JUMP  OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW          7.03 CFS     PIPE DIAMETER =  18.00 INCHES
PIPE LENGTH =    296.00 FEET          MANNING'S  N     0.01300

HYDRAULIC JUMP: DOWNSTREAM  RUN ANALYSIS  RESULTS

NORMAL DEPTH(FT) =      0.90          CRITICAL DEPTH(FT) =      1.03

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.72

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC         PRESSURE+
 CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
       0.000          0.719      8.392          1.813           130.26
       1.965          0.726      8.286          1.793           129.19
       3.964          0.734      8.183          1.774           128.16
       5.998          0.741      8.082          1.756           127.18
       8.072          0.748      7.984          1.738           126.23
      10.189          0.755      7.888          1.722           125.31
      12.354          0.762      7.794          1.706           124.44
      14.573          0.769      7.703          1.691           123.59
      16.851          0.776      7.613          1.677           122.79
      19.197          0.783      7.526          1.664           122.01
      21.619          0.791      7.441          1.651           121.27
      24.129          0.798      7.358          1.639           120.56
      26.738          0.805      7.276          1.628           119.88
      29.463          0.812      7.197          1.617           119.22
```

32.326	0.819	7.119	1.607	118.60
35.352	0.826	7.043	1.597	118.01
38.576	0.833	6.968	1.588	117.44
42.045	0.841	6.896	1.579	116.90
45.826	0.848	6.825	1.571	116.39
50.015	0.855	6.755	1.564	115.90
54.763	0.862	6.687	1.557	115.44
60.320	0.869	6.620	1.550	115.00
67.159	0.876	6.555	1.544	114.59
76.337	0.883	6.491	1.538	114.20
91.254	0.891	6.429	1.533	113.83
296.000	0.893	6.411	1.531	113.73

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 1.93

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.927	3.978	2.173	184.01
77.390	1.500	3.978	1.746	136.90

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL (FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
77.390	1.500	3.977	1.746	136.90
80.475	1.481	3.986	1.728	134.94
83.281	1.462	4.004	1.711	133.10
85.937	1.443	4.027	1.695	131.34
88.481	1.424	4.054	1.680	129.66
90.933	1.405	4.085	1.665	128.04
93.305	1.386	4.119	1.650	126.48
95.607	1.367	4.157	1.636	124.99
97.842	1.348	4.199	1.622	123.57
100.014	1.330	4.243	1.609	122.21
102.124	1.311	4.291	1.597	120.91
104.173	1.292	4.342	1.585	119.68
106.160	1.273	4.397	1.573	118.52
108.084	1.254	4.454	1.562	117.43
109.939	1.235	4.515	1.552	116.43
111.723	1.216	4.580	1.542	115.47
113.430	1.197	4.648	1.533	114.60
115.051	1.178	4.721	1.524	113.81
116.578	1.159	4.796	1.517	113.10
117.997	1.140	4.876	1.510	112.47
119.293	1.121	4.961	1.504	111.93
120.446	1.102	5.049	1.498	111.48
121.428	1.083	5.143	1.494	111.12
122.204	1.064	5.241	1.491	110.86
122.724	1.045	5.345	1.489	110.70
122.918	1.026	5.454	1.489	110.65
296.000	1.026	5.454	1.489	110.65

----------END OF HYDRAULIC JUMP ANALYSIS----------

PRESSURE+MOMENTUM BALANCE OCCURS AT 115.10 FEET UPSTREAM OF NODE 130.10
DOWNSTREAM DEPTH = 1.177 FEET, UPSTREAM CONJUGATE DEPTH = 0.891 FEET

NODE 130.09 : **HGL** = < 528.429>;EGL= < 529.523>;FLOWLINE= < 527.710>

****

FLOW PROCESS FROM NODE 130.09 TO NODE 130.09 IS CODE = 2
UPSTREAM NODE 130.09 ELEVATION = 528.04 (FLOW IS SUPERCRITICAL)

CALCULATE MANHOLE LOSSES(LACFCD):
PIPE FLOW = 7.03 CFS PIPE DIAMETER 18.00 INCHES
AVERAGED VELOCITY HEAD = 0.861 FEET
HMN = .05*(AVERAGED VELOCITY HEAD) = .05*(0.861) = 0.043

NODE 130.09 : **HGL** = < 528.940>;EGL= < 529.566>;FLOWLINE= < 528.040>

****

FLOW PROCESS FROM NODE 130.09 TO NODE 130.08 IS CODE = 1
UPSTREAM NODE 130.08 ELEVATION = 531.12 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 7.03 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 315.13 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.90 CRITICAL DEPTH(FT) = 1.03

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.72

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.720	8.383	1.812	130.17
1.993	0.727	8.274	1.791	129.07
4.017	0.735	8.167	1.771	128.01
6.075	0.742	8.064	1.752	127.00
8.172	0.749	7.962	1.734	126.02
10.311	0.757	7.864	1.718	125.09
12.495	0.764	7.767	1.702	124.19
14.732	0.772	7.673	1.686	123.33
17.026	0.779	7.582	1.672	122.51
19.384	0.786	7.492	1.659	121.72
21.816	0.794	7.405	1.646	120.96
24.332	0.801	7.320	1.634	120.24
26.944	0.808	7.236	1.622	119.55
29.669	0.816	7.155	1.611	118.89
32.525	0.823	7.076	1.601	118.26
35.539	0.831	6.998	1.592	117.66
38.744	0.838	6.922	1.583	117.10
42.185	0.845	6.848	1.574	116.56
45.927	0.853	6.776	1.566	116.04
50.062	0.860	6.705	1.559	115.56
54.736	0.868	6.635	1.552	115.10
60.190	0.875	6.568	1.545	114.67
66.879	0.882	6.501	1.539	114.26
75.824	0.890	6.436	1.533	113.87

90.302	0.897	6.373	1.528	113.52
315.130	0.900	6.352	I.526	113.40

NODE 130.08 : **HGL** = < 531.840>;EGL= < 532.932>;FLOWLINE= < 531.120>

******** ******** *********"**********

FLOW PROCESS FROM NODE 130.08 TO NODE 130.08 IS CODE = 2
UPSTREAM NODE 130.08 ELEVATION = 531.45 (FLOW IS SUPERCRITICAL)

CALCULATE MANHOLE LOSSES(LACFCD):
PIPE FLOW = 7.03 CFS PIPE DIAMETER 18.00 INCHES
AVERAGED VELOCITY HEAD = 0.857 FEET
HMN = .05*(AVERAGED VELOCITY HEAD) = .05*(0.857) = 0.043

NODE 130.08 : **HGL** = < 532.352>;EGL= < 532.975>;FLOWLINE= < 531.450>

****

FLOW PROCESS FROM NODE 130.08 TO NODE 130.04 IS CODE = l
UPSTREAM NODE 130.04 ELEVATION = 532.35 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD} :
PIPE FLOW 7.03 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 90.00 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT} = 0.90 CRITICAL DEPTH(FT} = 1.03

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT} = 1.02

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.023	5.473	1.489	110.65
0.036	1.018	5.503	1.489	110.66
0.107	1.013	5.534	I.489	110.67
0.215	1.008	5.565	I.489	110.70
0.364	1.003	5.596	1.490	110.73
0.557	0.998	5.628	1.490	110.77
0.800	0.993	5.660	I.491	110.82
1.097	0.988	5.693	I.492	110.88
1.456	0.983	5.726	1.492	110.95
1.883	0.978	5.759	1.493	111.02
2.387	0.973	5.794	I.494	111.11
2.979	0.968	5.828	1.496	111.20
3.673	0.963	5.863	1.497	UL30
4.484	0.958	5.899	I.499	rn.
5.433	0.953	5.935	I.500	111.53
6.546	0.948	5.971	I.502	111.66
7.858	0.943	6.008	1.504	111.80
9.417	0.938	6.046	1.506	111.94
11.288	0.933	6.084	1.508	112.10
13.568	0.928	6.123	1.510	112.27
16.407	0.923	6.162	I.513	112.44
20.057	0.918	6.202	1.515	112.63
24.989	0.913	6.242	1.518	112.83
32.261	0.908	6.283	I.521	113.04
45.271	0.903	6.325	1.524	113.26

```
        90.000          0.902       6.328          1.525           113.27

  NODE    130.04 : HGL = <  533.373>;EGL= <  533.839>;FLOWLINE= <  532.350>

************************************************    ************************
  FLOW PROCESS FROM NODE    130.04 TO NODE    130.04 IS CODE =  5
  UPSTREAM NODE   130.04     ELEVATION =   532.68   (FLOW IS SUBCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES)  (DEGREES) ELEVATION   DEPTH(FT.)  (FT/SEC)
     UPSTREAM       3.97      18.00      80.00     532.68       0.76        2.252
    DOWNSTREAM      7.03      18.00                532.35       1.03        5.455
    LATERAL #1      3.06      18.00      90.00     532.68       0.67        2.226
    LATERAL #2      0.00       0.00       0.00       0.00       0.00        0.000
       Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY= (Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4)}/((Al+A2}*16.l)+FRICTION LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00131
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00679
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00405
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.016 FEET         ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES   {DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES   ( 0.402)+( 0.000) =   0.402

  NODE    130.04 : HGL = <  534.162>;EGL= <  534.24l>;FLOWLINE= <  532.680>

************************************************************** ********** *
  FLOW PROCESS FROM NODE    130.04 TO NODE    130.07 IS CODE =  1
  UPSTREAM NODE   130.07     ELEVATION =   533.11   (FLOW IS SUBCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW         3.97 CFS      PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH =     21.52 FEET          MANNING'S N    0.01300

  NORMAL DEPTH(FT} =      0.53          CRITICAL DEPTH{FT) =      0.76
========================================================= ==================
  DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.48
==========  ========================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------- ------------------------------   ----------------------
       DISTANCE      FLOW DEPTH  VEJ.OCITY      SPEC ETC      ....PRESSU     .
         FROM           (FT}      (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
    CONTROL(FT}
        0.000          1.482       2.251          1.561           98.06
        1.479          1.453       2.267          1.533           95.02
        2.932          1.425       2.289          1.506           92.06
        4.363          1.396       2.316          1.479           89.18
        5.776          1.367       2.348          1.453           86.36
        7.171          1.338       2.385          1.427           83.63
        8.549          1.309       2.425          1.401           80.98
        9.909          1.281       2.470          1.375           78.41
       11.251          1.252       2.519          1.350           75.92
       12.573          1.223       2.573          1.326           73.54
       13.875          1.194       2.631          1.302           71.24
```

```
        15.153          1.165       2.694          1.278           69.05
        16.406          1.137       2.762          1.255           66.96
        17.630          1.108       2.836          1.233           64.98
        18.823          1.079       2.916          1.211           63.12
        19.980          1.050       3.003          1.190           61.38
        21.095          1.021       3.096          1.170           59.76
        21.520          1.010       3.136          1.163           59.15

  NODE    130.07 : HGL = <   534.120>;EGL= <   534.273>;FLOWLINE= <   533.110>

****************************************************    *************************
  FLOW PROCESS FROM NODE    130.07 TO NODE    130.07 IS CODE =   8
  UPSTREAM NODE   130.07     ELEVATION =    533.11   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       3.97 CFS           PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =   3.14 FEET/SEC.   VELOCITY HEAD =  0.153 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.153) =  0.031

  NODE    130.07 : HGL = <   534.303>;EGL= <   534.303>;FLOWLINE= <   533.110>

****************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    130.07            FLOWLINE ELEVATION =    533.11
  ASSUMED UPSTREAM CONTROL HGL =     533.87 FOR DOWNSTREAM RUN ANALYSIS

====================    =============== ==================== = ==== == == =====
  END OF GRADUALLY VARIED FLOW ANALYSIS
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**************************************************************************
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            Ver. 8.0  Release Date: 01/01/2003  License ID 1261

                            Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                           San Diego, California 92110
                          619291-0707    Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* McMILLIN OTAY RANCH VILLAGE 7                                 J-14531A  *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 13000 (NODE 13010 TO 13013 LATERAL) *
* 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT    *
 ************************************************************************

  FILE NAME: A:/130008.PIP
  TIME/DATE OF STUDY: 10:36 09/23/2004

**************************** ****************************************** **
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                 (Note: "*" indicates nodal point data used.)
                      UPSTREAM RUN                  DOWNSTREAM  RUN
   NODE     MODEL    PRESSURE      PRESSURE+          FLOW         PRESSURE+
  NUMBER   PROCESS   HEAD(FT)   MOMENTUM(POUNDS)    DEPTH(FT]   MOMENTUM(POUNDS)
  130.10-              1.92*      141.84              0.46            55.14
       } FRICTION
  130.13-              1.49*           94.93          0.71 De         42.94
       } CATCH BASIN
  130.13-              1.56*           89.80          0.71 De         15.17

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEADLOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**************************************************************************     **
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   130.10          FLOWLINE ELEVATION =   524.75
 PIPE FLOW =      3.42 CFS       PIPE DIAMETER =  18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   526.670 FEET

 NODE   130.10 : HGL = <  526.670>;EGL= <  526.728>;FLOWLINE= <  524.750>

************************************************************  ***********
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.13 IS CODE =  1
 UPSTREAM NODE   130.13     ELEVATION =   525.18  (FLOW SEALS IN REACH)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          3.42 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH        4.25 FEET          MANNING'S N     0.01300
================ ========================== =   ===   ================= ======
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  DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     1.92
========= ===== == z=============== ======================== ========= ==========
  PRESSURE FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM        PRESSURE    VELOCITY       SPECIFIC         PRESSURE+
   CONTROL(FT)         HEAD(FT)    (FT/SEC)      ENERGY(FT)     MOMENTUM(POUNOS)
          0.000           1.920       1.935           1.978            141.84
          4.250           1.494       1.935           1.553             94.92

  NODE    130.13 : HGL = <  526.674>;EGL= <  526.733>;FLOWLINE= <  525.180>

******************************************  '******************************
  FLOW PROCESS FROM NODE   130.13 TO NODE   130.13 IS CODE =  8
  UPSTREAM NODE    130.13     ELEVATION =   525.18   (FLOW UNSEALS IN REACH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       3.42 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  1.94 FEET/SEC.   VELOCITY HEAD =  0.058 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.058) =  0.012

  NODE    130.13 : HGL = <  526.744>;EGL= <  526.744>;FLOWLINE= <  525.180>

****   ************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =   130.13           FLOWLINE ELEVATION =   525.18
  ASSUMED UPSTREAM CONTROL HGL =    525.89 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

```
**************************************************************************
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                            Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                            San Diego, California 92110
                          619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
  * McMILLIN OTAY RANCH VILLAGE 7                                J-14531A   *
 * PRESSURE PIPE FLOW ANALYSIS AT BASIN 13000 (NODE 13010 TO 13016 LATERAL) *
  * 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT *
 ************************************************************************

  FILE NAME: A:/13000C.PIP
  TIME/DATE OF STUDY: 11:27 09/23/2004

**************************************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        .NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                     UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+          FLOW         PRESSURE+
  NUMBER  PROCESS  HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)   MOMENTUM(POUNDS)
  130.10-              1.91*            154.67        0.61              80.86
        } FRICTION
  130.17-              0.90*             69.57        0.85 De           69.30
        } JUNCTION
  130.17-              1.14              51.72        0.20*             63.34
        } FRICTION
  130.16-              0.55*Dc           23.22        0.55*Dc           23.22
        } CATCH BASIN
  130.16-              0.79*             12.38        0.55 De            8.37

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**************************************************************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   130.10          FLOWLINE ELEVATION =   524.75
 PIPE FLOW =      4.94 CFS       PIPE DIAMETER =  18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =  526.660 FEET

 NODE   130.10 : HGL = <  526.660>;EGL= <  526.781>;FLOWLINE= <  524.750>

*****************  ********************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.17 IS CODE =  1
 UPSTREAM NODE   130.17    ELEVATION =   525.68  (FLOW SEALS IN REACH)
```

CALCULATE FRICTION LOSSES(LACFCD) :
PIPE FLOW 4.94 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 46.25 FEET MANNING'S N 0.01300

DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) = 1.91

PRESSURE FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	PRESSURE HEAD(FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.910	2.795	2.031	154.67
22.908	1.500	2.795	1.621	109.46

NORMAL DEPTH(FT) = 0.59 CRITICAL DEPTH(FT) = 0.85

ASSUMED DOWNSTREAM PRESSURE HEAD(FT) = 1.50

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
22.908	1.500	2.795	1.621	109.46
24.290	1.474	2.805	1.596	106.72
25.617	1.448	2.825	1.572	104.09
26.913	1.423	2.850	1.549	101.53
28.181	1.397	2.881	1.526	99.05
29.426	1.371	2.916	1.503	96.64
30.648	1.345	2.956	1.481	94.31
31.847	1.319	3.000	1.459	92.06
33.024	1.294	3.048	1.438	89.89
34.178	1.268	3.100	1.417	87.80
35.307	1.242	3.157	1.397	85.80
36.410	1.216	3.218	1.377	83.89
37.485	1.190	3.284	1.358	82.08
38.530	1.164	3.355	1.339	80.36
39.540	1.139	3.431	1.322	78.74
40.514	1.113	3.513	1.305	77.24
41.445	1.087	3.601	1.288	75.84
42.330	1.061	3.695	1.273	74.56
43.160	1.035	3.795	1.259	73.40
43.930	1.010	3.904	1.246	72.37
44.628	0.984	4.020	1.235	71.47
45.244	0.958	4.145	1.225	70.72
45.763	0.932	4.279	1.217	70.12
46.167	0.906	4.423	1.210	69.67
46.250	0.898	4.471	1.209	69.57

NODE 130.17 : **HGL** = < 526.578>;EGL= < 526.889>;FLOWLINE= < 525.680>

****

FLOW PROCESS FROM NODE 130.17 TO NODE 130.17 IS CODE = 5
UPSTREAM NODE 130.17 ELEVATION = 526.01 . (FLOW IS SUBCRITICAL)
(NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)

```
    UPSTREAM        2.12     18.00      0.00     526.01      0.55       15.246
   DOWNSTREAM       4.94     18.00               525.68      0.85        4.472
   LATERAL #1       0.00      0.00      0.00       0.00      0.00        0.000
   LATERAL #2       0.00      0.00      0.00       0.00      0.00        0.000
      QS            2.82===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)  -Q3*V3*COS(DELTA3) -
      Q4*V4*COS(DELTA4) )/( (Al+A2)*16.l)+FRICTION LOSSES
 UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.28674
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00493
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.14583
 JUNCTION LENGTH     4.00 FEET
 FRICTION LOSSES    0.583 FEET         ENTRANCE LOSSES    0.062 FEET
 JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES   ( 2.867)+( 0.062) =   2.930

 NODE    130.17 : HGL = <  526.209>;EGL= <  529.818>;FLOWLINE= <  526.010>

****************************************************************************
 FLOW PROCESS FROM NODE   130.17 TO NODE   130.16 IS CODE =  1
 UPSTREAM NODE   130.16     ELEVATION =   531.43  (FLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          2.12 CFS      PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =      13.75 FEET          MANNING'S N0.01300

 NORMAL DEPTH(FT) =      0.18           CRITICAL DEPTH(FT) =      0.55
=====   ======================================================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.55
=============================================================== ======
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEEJTH   VELOCITY      SPECIFIC        PRESSURE+
  CONTROL( FT)          (FT)     (FT/SEC)     ENERGY( FT)    MOMENTUM(POUNDS)
        0.000          0.550       3.614          0.752           23.22
        0.002          0.535       3.748          0.753           23.25
        0.008          0.520       3.892          0.756           23.33
        0.020          0.506       4.047          0.760           23.48
        0.037          0.491       4.213          0.767           23.69
        0.061          0.477       4.391          0.776           23.98
        0.093          0.462       4.584          0.788           24.34
        0.134          0.447       4.793          0.804           24.79
        0.187          0.433       5.020          0.824           25.32
        0.252          0.418       5.266          0.849           25.96
        0.332          0.403       5.535          0.879           26.71
        0.431          0.389       5.829          0.917           27.58
        0.553          0.374       6.152          0.962           28.58
        0.702          0.360       6.508          1.018           29.74
        0.886          0.345       6.902          1.085           31.07
        1.114          0.330       7.339          1.167           32.59
        1.397          0.316       7.827          1.268           34.35
        1.753          0.301       8.375          1.391           36.36
        2.206          0.287       8.993          1.543           38.68
        2.792          0.272       9.695          1.732           41.35
        3.570          0.257      10.497          1.970           44.46
        4.636          0.243      11.421          2.270           48.08
```

```
         6.175          0.228     12.495          2.654           52.33
         8.608          0.214     13.754          3.153           57.35
        13.284          0.199     15.247          3.811           63.36
        13.750          0.199     15.242          3.808           63.34

  NODE    130.16 : RGL = <   531.980>;EGL= <   532.182>;FLOWLINE= <   531.430>

**********************************************************************
  FLOW PROCESS FROM NODE    130.16 TO NODE  130.16 IS CODE =    8
  UPSTREAM NODE   130.16     ELEVATION =    531.43  (FLOW IS SUBCRITICAL}

  CALCULATE CATCH BASIN ENTRANCE LOSSES (LACFCD ):
  PIPE FLOW =       2.12 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW  VELOCITY  =  3.62  FEET/SEC.   VELOCITY  HEAD  =  0.203 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.203) =  0.041

  NODE    130.16 : HGL = <  532.223>;EGL= <  532.223>;FLOWLINE= <  531.430>

******************************    ******************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    130.16           FLOWLINE ELEVATION =    531.43
  ASSUMED UPSTREAM CONTROL HGL =    531.98 FOR DOWNSTREAM RUN ANALYSIS

======= ================================ ===== ============== = ============
  END OF GRADUALLY VARIED rLOW ANALYSIS
```

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**************************************************************************
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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                            619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* McMILLIN OTAY RANCH VILLAGE 7                                J-14531A  *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 13000 (NODE 13004 TO 13003 LATERAL) *
* 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT   *
 ************************************************************************

  FILE NAME: A:/13000D.PIP
  TIME/DATE OF STUDY: 11:55 09/23/2004

**************************************************************************
            GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                      NODAL POINT STATUS TABLE
              (Note: "*" indicates nodal point data used.)
                    UPSTREAM RUN                  DOWNSTREAM RUN
   NODE    MODEL    PRESSURE      PRESSURE+        FLOW        PRESSURE+
  NUMBER   PROCESS  HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
  130.04-             1.48*          91.13          0.37          58.93
        } FRICTION          } HYDRAULIC JUMP
  130.03-             0.67*Dc        37.98          0.67*Dc          37.98
        } CATCH BASIN
  130.03-             0.98*          20.42          0.67 De          13.48

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRO,LACFCD, AND OCEMA
 DESIGN MANUALS.
************************************************************************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =   130.04          FLOWLINE ELEVATION =   532.68
 PIPE FLOW =      3.11 CFS       PIPE DIAMETER    18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =  534.160 FEET

 NODE   130.04 : HGL = <  534.160>;EGL = <  534.208>;FLOWLINE= <  532.680>

************************************************************************
 FLOW PROCESS FROM NODE   130.04 TO NODE   130.03 IS CODE =  1
 UPSTREAM NODE   130.03    ELEVATION =   533.81  (HYDRAULIC JUMP OCCURS)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          3.11 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =     11.52 FEET          MANNING'S N     0.01300
```

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 0.31 CRITICAL DEPTH(FT) = 0.67

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.67

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.671	4.063	0.927	37.98
0.007	0.657	4.180	0.928	38.01
0.027	0.642	4.304	0.930	38.09
0.064	0.628	4.434	0.933	38.24
0.119	0.613	4.573	0.938	38.46
0.195	0.599	4.720	0.945	38.75
0.293	0.585	4.876	0.954	39.10
0.419	0.570	5.042	0.965	39.54
0.575	0.556	5.219	0.979	40.06
0.767	0.542	5.407	0.996	40.68
1.000	0.527	5.609	1.016	41.38
1.282	0.513	5.824	1.040	42.20
1.621	0.498	6.055	1.068	43.12
2.029	0.484	6.304	1.102	44.17
2.520	0.470	6.571	1.141	45.35
3.112	0.455	6.860	1.187	46.67
3.831	0.441	7.173	1.240	48.16
4.709	0.427	7.511	1.303	49.82
5.795	0.412	7.880	1.377	51.68
7.158	0.398	8.282	1.464	53.76
8.908	0.383	8.722	1.565	56.08
11.228	0.369	9.204	1.685	58.68
11.520	0.368	9.250	1.697	58.93

HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS

DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.48

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTRO.(FT)	FLOW DEPTH {FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.480	1.764	1.528	91.13
0.324	1.448	1.779	1.497	87.68
0.645	1.415	1.800	1.466	84.29
0.962	1.383	1.825	1.435	80.98
1.277	1.351	1.855	1.404	77.75
1.589	1.318	1.890	1.374	74.60
1.898	1.286	1.928	1.344	71.55
2.205	1.253	1.971	1.314	68.58
2.507	1.221	2.018	1.284	65.72
2.806	1.189	2.070	1.255	62.96
3.101	1.156	2.127	1.227	60.31
3.392	1.124	2.189	1.198	57.77
3.677	1.092	2.257	1.171	55.36
3.957	1.059	2.331	1.144	53.06
4.230	1.027	2.411	1.117	50.90

```
          4.495          0.995          2.500          1.092          48.88
          4.751          0.962          2.596          1.067          46.99
          4.996          0.930          2.702          1.043          45.26
          5.229          0.897          2.818          1.021          43.68
          5.447          0.865          2.945          1.000          42.27
          5.647          0.833          3.086          0.981          41.04
          5.826          0.800          3.242          0.964          39.99
          5.979          0.768          3.414          0.949          39.14
          6.099          0.736          3.606          0.938          38.51
          6.179          0.703          3.821          0.930          38.12
          6.209          0.671          4.063          0.927          37.98
         11.520          0.671          4.063          0.927          37.98
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
 1 PRESSURE+MOMENTUM BALANCE OCCURS AT     3.78 FEET UPSTREAM OF NODE  130.04 I
       DOWNSTREAM DEPTH = 1.080 FEET, UPSTREAM CONJUGATE DEPTH = 0.393 FEET I

  NODE    130.03 : HGL = <  534.481>;EGL= <  534.737>;FLOWLINE= <  533.810>

************************************    *************************************
  FLOW PROCESS FROM NODE    130.03 TO NODE    130.03 IS CODE =  8
  UPSTREAM NODE   130.03     ELEVATION =   533.81   (FLOW IS SUBCRITICAL)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       3.11 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY  =  4.07  FEET/SEC.    VELOCITY  HEAD  =  0.257 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.257) =  0.051

  NODE    130.03 : HGL = <  534.789>;EGL= <  534.789>;FLOWLINE= <  533.810>

************** ********************** ************************** ***************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =    130.03            FLOWLINE ELEVATION =  533.81
  ASSUMED UPSTREAM CONTROL HGL =    534.48 FOR DOWNSTREAM  RUN ANALYSIS


  END Of GRADUALLY VARIED FLOW ANALYSIS
```

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**************************************************************************
                PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
          (Reference: LACFCD,LACRD, AND OCEMA HYDRAULICS CRITERION)
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            Ver. 8.0  Release Date: 01/01/2003  License ID 1261

                            Analysis prepared by:

                          RICK ENGINEERING  COMPANY
                              5620 Friars Road
                            San Diego, California 92110
                          619-291-0707    Fax 619-291-4165

 **********k************** DESCRIPTION OF STUDY **************************
* McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A  *
* PRE.SSURE PIPE FLOW ANALYSIS AT BASIN 13000 (MAIN LINE)                  *
* 50-YR STORM EVENT, ULTIMATE CONDITION                          BY: PT    *
 **************************************************************************

  FILE NAME: A:/13000.PIP
  TIME/DATE OF STUDY: 09:36 09/23/2004

**************************************************************************
              GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                 (Note: "*" indicates nodal point data used:)
                      UPSTREAM RUN                  DOWNSTREAM RUN
   NODE     MODEL    PRESSURE      PRESSURE+        FLOW         PRESSURE+
  NUMBER   PROCESS  .HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
 1302.10-              4,00           5715.98        1.30*          14814.10
       ) FRICTION
 1302.00-              3.69*Dc        5630.23        3.69*Dc         5630.23
       ) JUNCTION
 1302.00-              7.80           8358.39        1.77*           9535.17
       ) FRICTION
 9002.00               3.40*Dc        5754.39        3.40*Dc         5754.39
       ) CATCH BASIN
 9002.00-              8.20*          3872.69        3.40 De          988.15

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE. =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
******************************** ****************************************  *
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  1302.10          FLOWLINE ELEVATION =  464.17
 PIPE FLOW =    164.00 CFS     PIPE DIAMETER =  48.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =  468.170 FEET

 NODE  1302.10 : HGL = <  465.47l>;EGL= <  498.669>;FLOWLINE= <  464.170>

************************************************************************** **
 FLOW PROCESS FROM NODE  1302.10 TO NODE  1302.00 IS CODE    1
 UPSTREAM NODE  1302 .00     ELEVATION =  520.95  (FLOW IS SUPERCRITICAL)
```

CALCULATE FRICTION LOSSES(LACFCD} :
PIPE FLOW 164.00 CFS PIPE DIAMETER = 48.00 INCHES
PIPE LENGTH = 168.19 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT} = 1.20 CRITICAL DEPTH(FT} = 3.69

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 3.69

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL{FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	3.692	13.525	6.535	5630.23
0.031	3.593	13.784	6.545	5637.69
0.124	3.493	14.084	6.575	5659.92
0.283	3.393	14.425	6.627	5697.03
0.513	3.294	14.810	6.702	5749.52
0.824	3.194	15.239	6.802	5818.17
1.226	3.095	15.716	6.932	5904.02
1.732	2.995	16.245	7.095	6008.40
2.359	2.895	16.831	7.297	6132.89
3.127	2.796	17.479	7.542	6279.39
4.064	2.696	18.195	7.840	6450.17
5.202	2.597	18.990	8.200	6647.92
6.583	2.497	19.872	8.633	6875.85
8.264	2.397	20.853	9.154	7137.78
10.315	2.298	21.949	9.783	7438.31
12.832	2.198	23.175	10.543	7783.00
15.946	2.099	24.554	11.466	8178.62
19.840	1.999	26.111	12.592	8633.46
24.776	1.899	27.879	13.976	9157.83
31.149	1.800	29.899	15.690	9764.59
39.584	1.700	32.222	17.832	10470.09
51.149	1.601	34.913	20.540	11295.29
67.869	1.501	38.059	24.007	12267.49
94.338	1.401	41.774	28.515	13422.85
145.374	1.302	46.211	34.481	14810.19
168.190	1.301	46.223	34.499	14814.10

NODE 1302.00 : **HGL** = < 524.642>;EGL= < 527.485>;FLOWLINE= < 520.950>

****

FLOW ROCESS FROM NODE 1302.00 TO NODE 1302.00 IS CODE = 5
UPSTREAM NODE 1302.00 ELEVATION = 521.95 (FLOW UNSEALS IN REACH)
(NOTE: POSSIBLE JUMP IN OR UPSTREAM OF STRUCTURE)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE {DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH(FT.)	VELOCITY (FT/SEC)
UPSTREAM	153.16	42.00	80.00	521.95	3.40	31.353
DOWNSTREAM	164.00	48.00		520.95	3.69	13.530
LATERAL #1	10.84	24.00	10.00	523.45	1.18	5.619
LATERAL #2	0.00	0.00	0.00	0.00	0.00	0.000
Q5	O.OO===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
D'i=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS{DELTA3)-

```
    Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
 UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.08898
 DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.01130
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.05014
 JUNCTION  LENGTH      5.00  FEET
 FRICTION LOSSES     0.251  FEET          ENTRANCE  LOSSES     0.000 FEET
 JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE  LOSSES)
 JUNCTION LOSSES    (11.501)+(  0.000)  =   11.501

 NODE   1302.00 : HGL = <  523.72l>;EGL=  <  538.985>;FLOWLINE= <  521.950>

****************************************************************************
 FLOW PROCESS FROM NODE  1302.00 TO NODE  9002.00 IS CODE =  1
 UPSTREAM NODE  9002.00     ELEVATION =   539.20  (FLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW         153.16 CFS     PIPE DIAMETER =  42.00 INCHES
 PIPE LENGTH =     128.76 FEET          MANNING'S  N     0.01300

 NORMAL DEPTH(FT) =      1.57           CRITICAL DEPTH(FT) =      3.40
=====================================  ========== ======================
 UPSTREAM  CONTROL  ASSUMED  FLOWDEPTH(FT) =     3.40
=========================================================   ========= ==   ==
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
-------------------  ------------------------------------------------------
 DISTANCE  FROM      FLOW  DEPTH   VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)           (FT)     (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
        0.000          3.396      16.053          7.400          5754.39
        0.109          3.323      16.223          7.412          5761.71
        0.415          3.250      16.436          7.447          5782.14
        0.907          3.177      16.686          7.503          5814.41
        1.584          3.104      16.972          7.580          5858.03
        2.455          3.031      17.294          7.678          5912.89
        3.533          2.958      17.65:).        7.799          5979.13
        4.840          2.885      18.045          7.945          6057.09
        6.400          2.813      18.478          8.117          6147.26
        8.247          2.740      18.950          8.319          6250.31
       10.423          2.667      19.465          8.554          6367.03
       12.979          2.594      20.027          8.825          6498.37
       15.981          2.521      20.637          9.138          6645.44
       19.511          2.448      21.302          9.499          6809.56
       23.676          2.375      22.025          9.913          6992.21
       28.614          2.302      22.814         10.389          7195.15
       34.512          2.230      23.673         10.937          7420.40
       41.623          2.157      24.612         11.569          7670.31
       50.306          2.084      25.639         12.298          7947.60
       61.093          2.011      26.766         13.142          8255.48
       74.812          1.938      28.004         14.123          8597.68
       92.854          1.865      29.369         15.267          8978.62
      117.842          1.792      30.878         16.607          9403.53
      128.760          1.771      31.343         17.035          9535.17
----------------------------------------------------------------------------
 NODE   9002.00 : HGL = <  542.596>;EGL= <  546.600>;FLOWLINE= <  539.200>

****************************************************************************
 FLOW PROCESS FROM NODE  9002.00 TO NODE  9002.00 IS CODE    8
 UPSTREAM NODE  9002.00     ELEVATION =   539.20  (FLOW UNSEALS  IN REACH)
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  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =     153.16 CFS           PIPE DIAMETER =  42.00 INCHES
  FLOW VELOCITY =  16.06 FEET/SEC.  VELOCITY HEAD =  4.004 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  4.004) =  0.801

  NODE   9002.00 : HGL = <  547.40l>;EGL= <  547.40l>;FLOWLINE= <  539.200>

******************+      ********************************************  '*******
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  9002.00            FLOWLINE ELEVATION =   539.20
  ASSUMED UPSTREAM CONTROL HGL =    542.60 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

SYSTEM 14000

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
(Reference: LACFCD, LACRD, AND OCEMA HYDRAULICS CRITERION)
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Analysis prepared by:

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DESCRIPTION OF STUDY

McMILLIN OTAY RANCH - VILLAGE-7 **J-14531A**
PRESSURE PIPE FLOW ANALYSIS AT BASIN 14000
soYR STORM EVENT, ULTIMATE CONDITION **BY:PT**

FILE NAME: A:/14000.PIP
TIME/DATE OF STUDY: 10:20 09/25/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
4026.00	FRICTION	3.00*	1344.27	1.96	1246.61
	HYDRAULIC JUMP				
4018.00	JUNCTION	3.04	1362.06	1.63*	1401.28
4018.00	FRICTION	2.58	1075.98	1.34*	1315.84
4014.00	JUNCTION	2.15 De	1010.04	1.46*	1222.75
4014.00	FRICTION	1.94 De	1065.95	1.59*	1147.83
4013.00	MANHOLE	1.94 De	1065.95	1.53*	1177.49
4013.00	FRICTION	1.94 De	1065.95	1.58*	1149.83
4009.00	JUNCTION	1.94 De	1065.95	1.78*	1082.81
4009.00	FRICTION	2.39	1020.66	1.45*	1058.09
4008.00	MANHOLE	1.92 De	938.06	1.42*	1075.32
4008.00	FRICTION	1.92 De	938.06	1.47*	1049.30
4007.00	JUNCTION	1.92 De	938.06	1.53*	1020.40
4007.00	FRICTION	1.92 De	938.06	1.59*	996.91
4004.00		1.92*Dc	938.06	1.92*Dc	938.06

```
        } JUNCTION
 4004.00-              5.96*          1685.39        1.25            1152.56
        } FRICTION
 4003.00-              4.09*          1319.06        1.91 De          903.17
        } CATCH BASIN
 4003.00-              6.27*          1033.83        1.91 De          178.75

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
**************************************************************************k**k* '***
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  4026.00            FLOWLINE ELEVATION =    514.37
  PIPE FLOW =      49.90 CFS        PIPE DIAMETER =  36.00  INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =   517.370  FEET

  NODE   4026.00 : HGL = <:  517.370>;EGL= <  518.144>;FLOWLINE= <  514.370>

******* ******************** ***************** ********************** ***** **** ****
  FLOW PROCESS FROM NODE  4026.00 TO NODE  4018.00 IS CODE =  1
  UPSTREAM NODE  4018.00     ELEVATION =   514.74   (HYDRAULIC JUMP OCCURS}

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          49.90 CFS     PIPE DIAMETER =  36.00 INCHES
  PIPE LENGTH =      73.31 FEET          MANNING'S N     0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT) =   2.64 &   2.95     CRITICAL DEPTH(FT) =      2.30
  NOTE: SUGGEST CONSIDERATION OF WAVE ACTION, UNCERTAINTY, ETC.

  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =      1.63
==========================================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH   VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          1.629      12.725          4.145          1401.28
         6.324          1.656      12.471          4.072          1383.27
        12.589          1.682      12.226          4.005          1366.40
        18.789          1.709      11.992          3.944          1350.63
        24.920          1.736      11.767          3.887          1335.89
        30.976          1.763      11.551          3.836          1322.15
        36.951          1.790      11.344          3.789          1309.36
        42.837          1.816      11.144          3.746          1297.47
        48.626          1.843      10.952          3.707          1286.46
        54.310          1.870      10.767          3.671          1276.28
        59.878          1.897      10.590          3.639          1266.91
        65.318          1.924      10.419          3.610          1258.31
        70.618          1.950      10.254          3.584          1250.44
        73.310          1.964      10.170          3.572          1246.61

  HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS
==========================================================================
  DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     3.00
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·PRESSURE FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      PRESSURE    VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)       HEAD(FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM( POUNDS)
        0.000          3.000       7.059          3.774          1344.27
       73.310          3.040       7.059          3.814          1362.06
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
| PRESSURE+MOMENTUM BALANCE OCCURS AT    57.51 FEET UPSTREAM OF NODE 4026.00 |
      DOWNSTREAM DEPTH = 3.032 FEET, UPSTREAM CONJUGATE DEPTH = 1.696 FEET |

 NODE  4018.00 : HGL = <  516.369>;EGL= <  518.885>;FLOWLINE= <  514.740>

******************  *************** ** ************ * ** ************ ********** •k**
 fLOW PROCESS FROM NODE  4018.00 TO NODE  4018.00 IS CODE =  5
 UPSTREAM NODE  4018.00     ELEVATION =   515.24   (FLOW IS SUPERCRITICAL)

 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER   ANGLE     FLOWLINE    CRITICAL    VELOCITY
                  (CFS)    IINCHES) (DEGREES) ELEVATION   DEPTH(FT.)   (FT/SEC)
    UPSTREAM      41.15      30.00     16.00     515.24       2.15        15.291
   DOWNSTREAVJ    49.90      36.00               514.74       2.30        12.729
   LATERAL #1      8.75      18.00     64.00     516.24       1.14         6.046
   LATERAL #2      0.00       0.00      0.00       0.00       0.00         0.000
      Q5           0.00===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V2-Ql*Vl*COS{DELTA1)-Q3*V3*COS{DELTA3)  -
     Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
 UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.03154
 DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.01702
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.02428
 JUNCTION LENGTH     4.00 FEET
 FRICTION LOSSES    0.097 FEET         ENTRANCE LOSSES    0.000 FEET
 JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES   ( 1.331)+( 0.000) =   1.331

 NODE  4018.00 : HGL = <  516.585>;EGL= <  520.215>;FLOWLINE= <  515.240>

 ************************************************************************
 FLOW PROCESS FROM NODE  4018.00 TO NODE  4014.00 IS CODE =  1
 UPSTREAM NODE  4014.00     ELEVATION =   519.04   (FLOW rS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          41.15 CFS     PIPE DIAMETER =  30.00 INCHES
 PIPE LENGTH =     113.26 FEET          MANNING'S N     0.01300

 NORMAL DEPTH(FT)        1.32          CRITICAL DEPTH(FT) =      2.15
 ========  ========  ========== ========== ==========  ==========
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.46
=======     ========================================================================
 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORtvJATION:

 DISTANCE FROM      FLOW DEPTH   VELOCITY      SPECIFIC        PRESSURE+
  CONTROL{FT)          (FT)     (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
        0.000          1.455      13.875          4.446          1222.75
        2.437          1.450      13.938          4.468          1226.76
```

5.001	1.444	14.001	4.490	1230.82
7.704	1.439	14.065	4.513	1234.94
10.559	1.433	14.130	4.536	1239.11
13.581	1.428	14.195	4.559	1243.33
16.786	1.423	14.261	4.583	1247.61
20.195	1.417	14.328	4.607	1251.95
23.832	1.412	14.395	4.631	1256.35
27.724	1.406	14.463	4.657	1260.80
31.904	1.401	14.532	4.682	1265.31
36.413	1.396	14.601	4.708	1269.89
41.298	1.390	14.671	4.734	1274.52
46.622	1.385	14.741	4.761	1279.21
52.459	1.379	14.813	4.789	1283.97
58.909	1.374	14.885	4.816	1288.79
66.102	1.369	14.958	4.845	1293.67
74.212	1.363	15.032	4.874	1298.62
83.485	1.358	15.106	4.903	1303.63
94.283	1.352	15.181	4.933	1308.70
107.163	1.347	15.257	4.964	1313.85
113.260	1.345	15.286	4.975	1315.84

NODE 4014.00 : **HGL** = < 520.495>;EGL= < 523.486>;FLOWLINE= < 519.040>

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

FLOW PROCESS FROM NODE 4014.00 TO NODE 4014.00 IS CODE = 5
UPSTREAM NODE 4014.00 ELEVATION = 519.54 (FLOW IS SUPERCRITICAL)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH (FT.)	VELOCITY (FT/SEC)
UPSTREAM	37.64	24.00	0.00	519.54	1.94	14.095
DOWNSTREAM	41.15	30.00		519.04	2.15	13.880
LATERAL #1	1.76	18.00	90.00	520.04	0.50	1.926
LATERAL #2	1.75	18.00	90.00	520.04	0.50	1.915
Q5	0.00===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.02952
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.02450
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.02701
JUNCTION LENGTH 4.00 FEET
FRICTION LOSSES 0.108 FEET ENTRANCE LOSSES 0.000 FEET
JUNCTION LOSSES (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES (0.724)+(0.000) = 0.724

NODE 4014.00 : **HGL** = < 521.125>;EGL= < 524.210>;FLOWLINE= < 519.540>

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

FLOW PROCESS FROM NODE 4014.00 TO NODE 4013.00 IS CODE = 1
UPSTREAM NODE 4013.00 ELEVATION = 528.25 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 37.64 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 296.00 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 1.59 CRITICAL DEPTH(FT) = 1.94

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.53

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.526	14.630	4.852	1177.49
3.298	1.528	14.606	4.843	1176.15
6.723	1.531	14.583	4.835	1174.82
10.286	1.533	14.559	4.827	1173.50
14.000	1.536	14.536	4.819	1172.19
17.880	1.538	14.512	4.811	1170.88
21.942	1.541	14.489	4.803	1169.59
26.207	1.543	14.466	4.795	1168.31
30.698	1.546	14.443	4.787	1167.03
35.442	1.548	14.420	4.779	1165.76
40.471	1.551	14.398	4.771	1164.51
45.826	1.553	14.375	4.764	1163.26
51.554	1.556	14.352	4.756	1162.02
57.715	1.558	14.330	4.749	1160.79
64.385	1.560	14.308	4.741	1159.57
71.661	1.563	14.286	4.734	1158.36
79.671	1.565	14.264	4.727	1157.15
88.587	1.568	14.242	4.719	1155.96
98.653	1.570	14.220	4.712	1154.77
110.224	1.573	14.198	4.705	1153.60
123.851	1.575	14.176	4.698	1152.43
140.459	1.578	14.155	4.691	1151.27
161.777	1.580	14.134	4.684	1150.12
191.699	1.583	14.112	4.677	1148.98
242.708	1.585	14.091	4.670	1147.84
296.000	1.585	14.091	4.670	1147.83

NODE 4013.00 : **HGL** = < 529.776>;EGL= < 533.102>;FLOWLINE= < 528.250>

****

FLOW PROCESS FROM NODE 4013.00 TO NODE 4013.00 IS CODE = 2
UPSTREAM NODE 4013.00 ELEVATION = 528.58 (FLOW IS SUPERCRITICAL)

CALCULATE MANHOLE LOSSES(LACFCD):
PIPE FLOW = 37.64 CFS PIPE DIAMETER 24.00 INCHES
AVERAGED VELOCITY HEAD = 3.214 FEET
HMN = .05*(AVERAGED VELOCITY HEAD) = .05*(3.214) = 0.161

NODE 4013.00 : **HGL** = < 530.161>;EGL= < 533.262>;FLOWLINE= < 528.580>

****

FLOW PROCESS FROM NODE 4013.00 TO NODE 4009.00 IS CODE = 1
UPSTREAM NODE 4009.00 ELEVATION = 537.46 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 37.64 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 296.00 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 1.57 CRITICAL DEPTH(FT) = 1.94

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==================================================  ====================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.78

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION;

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
         0.000          1.783     12.722          4.298          1082.81
         1.794          1.775     12.767          4.308          1084.59
         3.723          1.767     12.814          4.318          1086.45
         5.798          1.758     12.862          4.328          1088.40
         8.032          1.750     12.911          4.340          1090.43
        10.438          1.741     12.961          4.351          1092.54
        13.033          1.733     13.012          4.363          1094.74
        15.836          1.724     13.064          4.376          1097.03
        18.870          1.716     13.117          4.389          1099.41
        22.161          1.708     13.172          4.403          1101.87
        25.743          1.699     13.227          4.417          1104.42
        29.653          1.691     13.284          4.432          1107.06
        33.941          1.682     13.341          4.448          1109.78
        38.664          1.674     13.400          4.464          1112.60
        43.898          1.665     13.460          4.480          1115.50
        49.740          1.657     13.522          4.498          1118.50
        56.318          1.649     13.584          4.516          1121.59
        63.802          1.640     13.647          4.534          1124.77
        72.437          1.632     13.712          4.553          1128.05
        82.575          1.623     13.778          4.573          1131.41
        94.768          1.615     13.845          4.593          1134.88
       109.935          1.606     13.914          4.614          1138.44
       129.807          1.598     13.983          4.636          1142.10
       158.263          1.590     14.054          4.658          1145.86
       207.761          1.581     14.126          4.682          1149.72
       296.000          1.581     14.128          4.682          1149.83
-------------------------------------------------------------------------
  NODE  4009.00 : HGL = <  539.243>;EGL= <  541.758>;FLOWLINE= <  537.460>

******************  *****************  ****************************************
  FLOW PROCESS FROM NODE  4009.00 TO NODE  4009.00 IS CODE =  5
  UPSTREAM NODE  4009.00     ELEVATION =   537.79  (FLOW IS SUPERCRITICAL)

  CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE   CRITICAL   VELOCITY
                  (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM      34.81      24.00       0.00     537.79       1.92       14.220
   DOWNSTREAM     37.64      24.00                537.46       1.94       12.726
   LATERAL #1      1.42      18.00      90.00     538.29       0.45        1.197
   LATERAL #2      1.41      18.00      90.00     538.29       0.44        1.189
      QS           0.00===QS EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((A1+A2)*16.1)+FRICTION LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  l'RICTION SLOPE = 0.03064
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02457
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.02761
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES =  0.110 FEET         ENTRANCE LOSSES =  0.000 FEET
```

JUNCTION LOSSES = (DY+HV1-HV2)+{ENTRANCE LOSSES)
JUNCTION LOSSES = (0.627)+(0.000) = 0.627

NODE 4009.00 : **HGL** = < 539.245>;EGL= < 542.385>;FLOWLINE= < 537.790>

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

FLOW PROCESS FROM NODE 4009.00 TO NODE 4008.00 IS CODE = 1
UPSTREAM NODE 4008.00 ELEVATION = 546.84 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCO):
PIPE FLOW 34.81 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 296.00 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 1.46 CRITICAL DEPTH(FT) = 1.92

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT} = 1.42

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL{FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.425	14.538	4.709	1075.32
2.962	1.426	14.525	4.704	1074.57
6.044	1.427	14.511	4.699	1073.83
9.256	1.428	14.497	4.694	1073.09
12.610	1.430	14.483	4.689	1072.35
16.120	1.431	14.470	4.684	1071.62
19.803	1.432	14.456	4.679	1070.88
23.676	1.433	14.442	4.674	1070.15
27.762	1.435	14.429	4.669	1069.42
32.087	1.436	14.415	4.664	1068.70
36.681	1.437	14.402	4.660	1067.98
41.582	1.438	14.388	4.655	1067.25
46.835	1.440	14.375	4.650	1066.54
52.496	1.441	14.361	4.645	1065.82
58.637	1.442	14.348	4.641	1065.11
65.349	1.443	14.334	4.636	1064.40
72.753	1.445	14.321	4.631	1063.69
81.012	1.446	14.308	4.627	1062.98
90.355	1.447	14.295	4.622	1062.28
101.117	1.448	14.281	4.617	1061.58
113.818	1.450	14.268	4.613	1060.88
129.329	1.451	14.255	4.608	1060.18
149.283	1.452	14.242	4.604	1059.49
177.350	1.454	14.229	4.599	1058.80
225.303	1.455	14.216	4.595	1058.11
296.000	1.455	14.215	4.595	1058.09

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NODE 4008.00 : **HGL** = < 548.265>;EGL= < 551.549>;FLOWLINE= < 546.840>

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FLOW PROCESS FROM NODE 4008.00 TO NODE 4008.00 IS CODE = 2
UPSTREAM NODE 4008.00 ELEVATION = 547.17 (FLOW IS SUPERCRITICAL)

CALCULATE MANHOLE LOSSES(LACFCD):
PIPE FLOW = 34.81 CFS PIPE DIAMETER = 24.00 INCHES
AVERAGED VELOCITY HEAD = 3.175 FEET

HMN = .05*(AVERAGED VELOCITY HEAD) = .05*(3.175) = 0.159

NODE 4008.00 : **HGL** = < 548.64 l>;EGL= < 551.707>;FLOWLINE= < 547.170>

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

FLOW PROCESS FROM NODE 4008.00 TO NODE 4007.00 IS CODE = 1
UPSTREAM NODE 4007.00 ELEVATION = 555.75 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 34.81 CFS PIPE DIAMETER = 24.00 INCHES
PIPE LENGTH = 286.69 FEET MANNING' S N 0.01300

NORMAL DEPTH(FT) = 1.47 CRITICAL DEPTH(FT) = 1.92

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.53

GRADUALLY VARIED **FLOW** PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.532	13.477	4.354	1020.40
2.505	1.529	13.500	4.361	1021.50
5.131	1.527	13.522	4.368	1022.61
7.886	1.524	13.545	4.375	1023.73
10.784	1.522	13.567	4.382	1024.86
13.838	1.519	13.590	4.389	1025.99
17.064	1.517	13.613	4.396	1027.14
20.481	1.514	13.636	4.403	1028.29
24.111	1.512	13.659	4.411	1029.45
27.980	1.509	13.683	4.418	1030.62
32.118	1.507	13.706	4.426	1031.80
36.563	1.504	13.730	4.433	1032.99
41.360	1.502	13.753	4.441	1034.19
46.565	1.499	13.777	4.448	1035.40
52.250	1.497	13.801	4.456	1036.61
58.507	1.494	13.825	4.464	1037.84
65.456	1.492	13.849	4.472	1039.07
73.259	1.489	13.873	4.480	1040.31
82.148	1.487	13.898	4.488	1041.57
92.455	1.484	13.922	4.496	1042.83
104.703	1.481	13.947	4.504	1044.10
119.761	1.479	13.972	4.512	1045.38
139.265	1.476	13.997	4.520	1046.67
166.882	1.474	14.022	4.529	1047.96
214.392	1.471	14.047	4.537	1049.27
286.690	1.471	14.047	4.537	1049.30

NODE 4007.00 : **HGL** = < 557.282>;EGL= < 560.104>;FLOWLINE= < 555.750>

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

FLOW PROCESS FROM NODE 4007.00 TO NODE 4007.00 IS CODE = 5
UPSTREAM NODE 4007.00 ELEVATION = 556.08 (FLOW IS SUPERCRITICAL)

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH (FT.)	VELOCITY (FT/SEC)
UPSTREAM	34.81	24.00	0.00	556.08	1.92	12.990

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   DOWNSTREAM      34.81    24.00              555.75      1.92       13.481
   LATERAL #1       0.00    24.00     90.00    556.08      0.00        0.000
   LATERAL #2       0.00     0.00      0.00      0.00      0.00        0.000
      Q5            O.OO===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY={Q2*V2-Ql*Vl*COS(DELTA1) -Q3*V3*COS(DELTA3) -
     Q4*V4*COS(DELTA4))/({Al+A2}*16.l)+FRICTION LOSSES
UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02506
DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02715
 AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.02610
 JUNCTION LENGTH     4.00 FEET
 FRICTION LOSSES    0.104 FEET         ENTRANCE LOSSES    0.000 FEET
 JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
 JUNCTION LOSSES   ( 0.187)+( 0.000) =   0.187

 NODE   4007.00 : HGL = <  557.67l>;EGL= <  560.29l>;FLOWLINE= <  556.080>

******** ******************************************************************************
 FLOW PROCESS FROM NODE  4007.00 TO NODE  4004.00 IS CODE =  1
 UPSTREAM NODE  4004.00     ELEVATION =   556.51  (fLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          34.81 CFS     PIPE DIAMETER =  24.00 INCHES
 PIPE LENGTH =      4.25 E'EET          MANNING'S N     0.01300

 NORMAL DEPTH(FT) =      0.98           CRITICAL DEPTH(FT) =      1.92

 UPSTREAM CONTROL ASSUMED fLOWDEPTH(FT) =     1.92

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECifIC        PRESSURE+
  CONTROL(fT)           (FT)    (FT/SEC)     ENERGY( FT)    MOMENTUM(POUNDS)
        0.000          1.919     11.232          3.879           938.06
        0.056          1.881     11.351          3.883           938.92
        0.217          1.844     11.494          3.896           941.39
        0.4BO          1.806     11.657          3.917           945.37
        0.847          1.769     11.840          3.947           950.81
        1.323          1.731     12.044          3.985           957.71
        1.916          1.694     12.267          4.032           966.08
        2.637          1.656     12.511          4.088           975.98
        3.500          1.619     12.777          4.155           987.46
        4.250          1.591     12.985          4.211           996.91

 NODE   4004.00 : HGL = <  558.429>;EGL= <  560.389>;FLOWLINE= <  556.510>

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 FLOW PROCESS FROM NODE  4004.00 TO NODE  4004.00 IS CODE =  5
 UPSTREAM NODE  4004.00     ELEVATION =   556.84  (FLOW UNSEALS IN REACH)

 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                  (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)    (FT/SEC)
    UPSTREAM      34.00     24.00      90.00     556.84       1.91        10.822
   DOWNSTREAM     34.81     24.00                556.51       1.92        11.235
   LATERAL #1      0.00      0.00       0.00       0.00       0.00         0.000
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   LATERAL #2      0.00     0.00      0.00      0.00      0.00        0.000
      Q5           0.8l===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(  DELTA1}-Q3*V3*COS(DELTA3)-
      Q4*V4*COS( DELTA4 ))/( (Al+A2)*16.l)+FRICTION  LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02259
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.02062
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.02160
  JUNCTION LENGTH      4.00 FEET
  FRICTION LOSSES     0.086 FEET         ENTRANCE LOSSES    0.392 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    { 3.838)+{ 0.392) =    4.230

  NODE   4004.00 : HGL = <  562.800>;EGL= <  564.619>;FLOWLINE= <  556.840>

 ****************************************************************************
  FLOW PROCESS FROM NODE  4004.00 TO NODE  4003.00 IS CODE =  1
  UPSTREAM NODE  4003.00     ELEVATION =   559.20  (FLOW IS UNDER PRESSURE)

  CALCULATE FRICTION LOSSES (LACFCD):
  PIPE FLOW          34.00 CFS     PIPE DIAMETER =  24.00 INCHES
  PIPE LENGTH        21.75 FEET          MANNING'S N     0.01300
  SF=(Q/K)**2    {(     34.00)/(   226.229} )**2 = 0.02259
  HF=L*SF = (     21.75)*(0.02259) =      0.491

  NODE   4003.00 : HGL = <  563.29l>;EGL= <  565.llO>;FLOWLINE= <  559.200>

*************************** ************************************************ *******
  FLOW PROCESS FROM NODE  4003.00 TO NODE  4003.00 IS CODE =  8
  UPSTREAM NODE  4003.00     ELEVATION =   559.20   (FLOW IS UNDER PRESSURE)

  CALCULATE CATCH BASIN ENTRANCE LOSSES( LACFCD}:
  PIPE FLOW =       34.00 CFS        PIPE DIAMETER =  24.00 INCHES
  FLOW VELOCITY =  10.82 FEET/SEC.  V ELOCITY HEAD =  1.819 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  1.819) =  0.364

  NODE   4003.00 : HGL = <  565.474>;EGL= <  565.474>;FLOWLINE= <  559.200>

 ****************************************************************************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  4003.00           FLOWLINE ELEVATION =   559.20
  ASSUMED UPSTREAM CONTROL HGL =    561.11 FOR DOWNSTREAM RUN ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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Analysis prepared by:

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** DESCRIPTION OF STUDY **

McMILLIN OTAY RANCH VILLAGE 7 J-14531A
PRESSURE PIPE FLOW ANALYSIS AT BASIN 14000 (NODE 14018 TO 14021 LATERAL)
50-YR STORM EVENT, ULTIMATE CONDITION BY:PT

FILE NAME: A:/140008.PIP
TIME/DATE OF STUDY: 11:04 09/25/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
{Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(fT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
4018.00-		l.25*Dc	195.78	l.24*Dc	195.80
)	FRICTION				
4022.00-		l.25*Dc	195.78	1.25*De	195.78
}	JUNCTION				
4022.00-		2.13*	198.39	0.86	101.50
)	FRICTION				
4021.00-		1.73*	153.93	0.98 De	98.81
)	CATCH BASIN				
4021.00-		1.98*	135.62	0.98 De	32.90

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD, LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 4018.00 FLOWLINE ELEVATION = 516.24
PIPE FLOW = 10.64 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 516.590 FEET
*NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH{ 0.35 FT.)
IS LESS THAN CRITICAL DEPTH(1.25 FT.}
===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
FOR UPSTREAM RUN ANALYSIS

NODE 4018.00 : **HGL** = < 517.484>;EGL= < 518.200>;FLOWLINE= < 516.240>

```
**************************************************************************
 FLOW PROCESS FROM NODE  4018.00 TO NODE  4022.00 rs CODE =  1
 UPSTREAM NODE  4022.00     ELEVATION =   517.00  (FLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          10.64 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH =      75.57 FEET          MANNING'S N     0.01300

 NORMAL DEPTH(FT) =   1.24 &   1.50     CRITICAL DEPTH(FT) =      1.25
 NOTE: SUGGEST CONSIDERATION OF WAVE ACTION, UNCERTAINTY, ETC.

 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.25

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY     SPECIFIC         PRESSURE+
  CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
        0.000          1.252      6.748          1.960           195.78
        0.002          1.252      6.750          1.960           195.78
        0.008          1.252      6.752          1.960           195.78
        0.019          1.251      6.753          1.960           195.78
        0.035          1.251      6.755          1.960           195.78
        0.057          1.251      6.757          1.960           195.78
        0.084          1.250      6.758          1.960           195.78
        0.119          1.250      6.760          1.960           195.78
        0.161          1.250      6.762          1.960           195.78
        0.211          1.249      6.764          1.960           195.78
        0.271          1.249      6.765          1.960           195.79
        0.342          1.248      6.767          1.960           195.79
        0.425          1.248      6.769          1.960           195.79
        0.523          1.248      6.770          1.960           195.79
        0.638          1.247      6.772          1.960           195.79
        0.772          1.247      6.774          1.960           195.79
        0.932          1.247      6.776          1.960           195.79
        1.121          1.246      6.777          1.960           195.79
        1.349          1.246      6.779          1.960           195.79
        1.626          1.246      6.781          1.960           195.79
        1.972          1.245      6.782          1.960           195.79
        2.417          1.245      6.784          1.960           195.79
        3.018          1.245      6.786          1.960           195.79
        3.905          1.244      6.788          1.960           195.79
        5.493          1.244      6.789          1.960           195.80
       75.570          1.244      6.791          1.960           195.80
---------------------------------------    ----------------------------------
 NODE  4022.00 : HGL = <  518.252>;EGL= <  518.960>;FLOWLINE= <  517.000>

********************** ********* ** *************** ****************** * *******
 FLOW PROCESS FROM NODE  4022.00 TO NODE  4022.00 IS CODE =  5
 UPSTREAM NODE  4022.00     ELEVATION =   517.33  (FLOW UNSEALS IN REACH)

 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER   ANGLE     FLOWLINE   CRITICAL   VELOCITY
                  (CFS)    (INCHES) (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
   UPSTREAM        6.46      18.00     70.00     517.33       0.98       3.656
  DOWNSTREAM      10.64      18.00               517.00       1.25       6.750
   LATERAL #1      4.18      18.00     90.00     517.33       0.78       2.365
   LATERAL #2      0.00       0.00      0.00       0.00       0.00       0.000
```

```
      QS           O .OO===QS EQUALS BASIN  INPUT===

  LACFCD AND OCEMA FLOW JUNCTION  FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1} -Q3*V3*COS( DELTA3} -
      Q4*V4 *COS(DELTA4 ))/( (Al+A2)*16.l)+FRICTION  LOSSES
  UPSTREAM:     MANNING'S N  = 0.01300;  FRICTION  SLOPE =  0.00378
  DOWNSTREAM:   MANNING'S N  = 0.01300;  FRICTION  SLOPE =  0.00994
  AVERAGED  FRICTION  SLOPE  IN  JUNCTION  ASSUMED  AS  0.00686
  JUNCTION LENGTH      4.00  FEET
  FRICTION LOSSES     0.027 FEET          ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE  LOSSES)
  JUNCTION LOSSES    ( 0.712)+(  0.000) =    0.712

  NODE   4022.00 : HGL = <   519.464>;EGL= <   519.672>;FLOWLINE= <   517.330>

****************************************  ********************  ***** **********
  FLOW  PROCESS  FROM  NODE   4022.00 TO NODE   4021.00 rs CODE =   1
  UPSTREAM  NODE   4021.00      ELEVATION  =    517.98   (FLOW rs  UNDER  PRESSURE)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW            6.46 CFS      PIPE DIAMETER =  18.00 INCHES
  PIPE  LENGTH        65.25 FEET           MANNING'S  N      0.01300
  SF=(Q/K)**2    ((      6.46)/(    105.046)}**2 = 0.00378
  HF'=L*SF = (      65.25)*(0.00378)  =       0.247

  NODE   4021.00 : HGL = <   519.711>;EGL= <   519.918>;FLOWLINE= <   517.980>

**************************************** ********************************* ****
  FLOW  PROCESS  FROM  NODE   4021.00 TO NODE   4021.00 IS CODE =   8
  UPSTREAM NODE   4021.00      ELEVATION  =    517.98   (FLOW  IS  UNDER  PRESSURE)

  CALCULATE  CATCH  BASIN  ENTRANCE  LOSSES.(LACFCD):
  PIPE  FLOW =         6.46 CFS           PIPE  DIAMETER =   18.00 INCHES
  FLOW  VELOCITY  =  3. 66  FEET/SEC.    VELOCITY  HEAD  =   0.208 FEET
  CATCH  BASIN  ENERGY  LOSS =  .2*(VELOCITY HEAD) =  .2*(   0.208) =   0.042

  NODE   4021.00 : HGL = <   519.960>;EGL= <   519.960>;fLOWLINE= <   517.980>

******************************** ****************************************
  UPSTREAM  PIPE  FLOW  CONTROL  DATA:
  NODE NUMBER =   4021.00             FLOWLINE ELEVATION  =    517.98
  ASSUMED UPSTREAM CONTROL HGL =     518.96 FOR DOWNSTREAM  RUN ANALYSIS

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  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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**************************************************************************
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                            Analysis prepared by:

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                            San Diego, California 92110
                          619-291-0707    Fax 619-291-4165

 ************* * ********** DESCRIPTION OF STUDY *************** *********
  * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A    *
 * PRESSURE PIPE FLOW ANALYSIS AT BASIN 14000 (NODE 14022 TO 14025 LATERAL) *
  * 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT     *
 *************** ****** ********************************  ********************

  FILE NAME: A:/14000C.PIP
  TIME/DATE OF STUDY: 11:12 09/25/2004

*****************************h****** ***************************************
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                (Note: "*" indicates nodal point data used.)
                     UPSTREAM RUN                    DOWNSTREAM RUN
   NOOE     MODEL   PRESSURE        PRESSURE+          FLOW         PRESSURE+
 NUMBER   PROCESS  HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(fT)    MOMENTUM( POUNDS)
 4022.00-              2.13*             172.07         0.54         69.03
       ) FRICTION
     4025.00-             1.81*            136.28        0.79 De          57.10
       | CATCH BASIN
      4025.00-             1.91*            128.32        0.79 De          19.89

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
************************************************************    *******    ** * *
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  4022.00            FLOWLINE ELEVATION =   517.33
 PIPE FLOW =       4.26 CFS        PIPE DIAMETER =  18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =  519.460 FEET

 NODE  4022.00 : HGL = <  519.460>;EGL= <  519.550>;FLOWLINE=  <  517.330>

*******  ************************ *** ** *** ******************** ***************** *
 FLOW PROCESS FROM NODE  4022.00 TO NODE  4025.00 IS CODE =  1
 UPSTREAM NODE  4025.00     ELEVATION =   517.66   (FLOW IS UNDER PRESSURE)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW           4.26 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE LENGTH         3.25 FEET          MANNING'S N     0.01300
 SF=(Q/K)**2    ((      4.26)/(   104.790))**2 = 0.00165
```

```
  HF=L*SF = (      3.25)*(0.00165) =     0.005

  NODE   4025.00 : HGL = <   519.465>;EGL= <   519.556>;FLOWLINE= <   517.660>

**********************************************   ************** ************** **
  FLOW PROCESS FROM NODE   4025.00 TO NODE   4025.00 IS CODE =  8
  UPSTREAM NODE   4025.00     ELEVATION =    517.66   (FLOW IS UNDER PRESSURE)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =        4.26 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY  =  2.41  FEET/SEC.    VELOCITY  HEAD  =  0.090 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(   0.090) =  0.018

  NODE   4025.00 : HGL = <   519.574>;EGL= <   519.574>;FLOWLINE= <   517.660>

************************************************************************** **********
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  4025.00            FLOWLINE ELEVATION =   517.66
  ASSUMED UPSTREAM CONTROL HGL =    518.45 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

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DESCRIPTION OF STUDY

McMILLIN OTAY RANCH VILLAGE 7 **J-14531A**
PRESSURE PIPE FLOW ANALYSIS AT BASIN 14000 (NODE 14014 TO 14030)
50-YR STORM EVENT, ULTIMATE CONDITION **BY:PT**

FILE NAME: A:/140000.PIP
TIME/DATE OF STUDY: 11:40 09/25/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
4014.00	FRICTION	1.09	74.89	0.61*	78.47
4030.00	CATCH BASIN	0.85*Dc	67.83	0.85*Dc	67.83
4030.00		1.26*	37.36	0.85 De	23.37

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 4014.00 FLOWLINE ELEVATION = 520.04
PIPE FLOW = 4.86 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 521.130 FEET

NODE 4014.00 : **HGL** = < 520.651>;EGL= < 521.453>;FLOWLINE= < 520.040>

FLOW PROCESS FROM NODE 4014.00 TO NODE 4030.00 IS CODE = 1
UPSTREAM NODE 4030.00 ELEVATION = 520.78 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 4.86 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 37.00 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.59 CRITICAL DEPTH(FT) = 0.85

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.85

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.848	4.720	1.194	67.83
0.017	0.837	4.791	1.194	67.85
0.071	0.827	4.864	1.195	67.90
0.165	0.817	4.940	1.196	67.98
0.304	0.806	5.019	1.198	68.09
0.491	0.796	5.100	1.200	68.24
0.734	0.786	5.184	1.203	68.42
1.037	0.776	5.270	1.207	68.64
1.409.	0.765	5.360	1.212	68.90
1.858	0.755	5.453	1.217	69.20
2.395	0.745	5.549	1.223	69.53
3.034	0.734	5.649	1.230	69.91
3.789	0.724	5.752	1.238	70.34
4.681	0.714	5.859	1.247	70.81
5.733	0.704	5.969	1.257	71.33
6.979	0.693	6.085	1.268	71.89
8.459	0.683	6.204	1.281	72.51
10.232	0.673	6.328	1.295	73.18
12.375	0.662	6.457	1.310	73.91
15.008	0.652	6.591	1.327	74.70
18.310	0.642	6.731	1.346	75.54
22.586	0.632	6.876	1.366	76.45
28.405	0.621	7.027	1.389	77.43
37.000	0.611	7.184	1.413	78.47

NODE 4030.00 : **HGL** = < 521.628>;EGL= < 521.974>;FLOWLINE= < 520.780>

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

FLOW PROCESS FROM NODE 4030.00 TO NODE 4030.00 IS CODE = 8
UPSTREAM NODE 4030.00 ELEVATION = 520.78 (FLOW IS SUBCRITICAL)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
PIPE FLOW = 4.86 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 4.72 FEET/SEC. VELOCITY HEAD = 0.346 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.346) = 0.069

NODE 4030.00 : **HGL** = < 522.043>;EGL= < 522.043>;FLOWLINE= < 520.780>

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

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 4030.00 FLOWLINE ELEVATION = 520.78
ASSUMED UPSTREAM CONTROL **HGL** = 521.63 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

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DESCRIPTION OF STUDY

McMILLIN OTAY RANCH VILLAGE 7 **J-14531A**
PRESSURE PIPE FLOW ANALYSIS AT BASIN 14000 (NODE 14009 TO 14012 LATERAL)
50-YR STORM EVENT, ULTIMATE CONDITION **BY:PT**

FILE NAME: A:/14000E.PIP
TIME/DATE OF STUDY: 11:18 09/25/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
4009.00-		0.96	54.24	0.48*	61.99
	} FRICTION				
4012.00-		0.74*Dc	48.71	0.74*Dc	48.71
	} CATCH BASIN				
4012.00-		1.42*	37.26	0.74 De	17.11

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 4009.00 FLOWLINE ELEVATION = 538.29
PIPE FLOW = 3.77 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 539.250 FEET

NODE 4009.00 : **HGL** = < 538.774>;EGL= < 539.68l>;FLOWLINE= < 538.290>

FLOW PROCESS FROM NODE 4009.00 TO NODE 4012.00 IS CODE = 1
UPSTREAM NODE 4012.00 ELEVATION = 538.72 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 3.77 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 4.25 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.34 CRITICAL DEPTH(FT) = 0.74

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.74

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.742	4.324	1.033	48.71
0.007	0.726	4.447	1.033	48.75
0.030	0.710	4.577	1.035	48.86
0.070	0.694	4.715	1.039	49.06
0.130	0.678	4.861	1.045	49.33
0.213	0.662	5.016	1.053	49.70
0.321	0.646	5.181	1.063	50.17
0.459	0.629	5.357	1.075	50.73
0.630	0.613	5.544	1.091	51.40
0.841	0.597	5.743	1.110	52.19
1.097	0.581	5.957	1.133	53.11
1.406	0.565	6.186	1.160	54.16
1.779	0.549	6.432	1.192	55.36
2.228	0.533	6.697	1.230	56.72
2.768	0.517	6.982	1.274	58.25
3.420	0.501	7.290	1.327	59.97
4.212	0.485	7.624	1.388	61.91
4.250	0.484	7.638	1.391	61.99

NODE 4012.00 ; **HGL** = < 539.462>;EGL= < 539.753>;FLOWLINE= < 538.720>

****

FLOW PROCESS FROM NODE 4012.00 TO NODE 4012.00 IS CODE = 8
UPSTREAM NODE 4012.00 ELEVATION = 538.39 (FLOW IS SUBCRITICAL)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD) ;
PIPE FLOW = 3.77 CFS PIPE DIAMETER = 18.00 INCHES
FLOW V ELOCITY = 4.33 FEET/SEC. VELOCITY HEAD = 0.291 FEET
CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(0.291) = 0.058

NODE 4012.00 : **HGL** = < 539.8ll>;EGL= < 539.8ll>;FLOWLINE= < 538.390>

****

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 4012.00 FLOWLINE ELEVATION = 538.39
ASSUMED UPSTREAM CONTROL **HGL** = 539.13 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 14000 (NODE 14009 TO 14015 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *

FILE NAME: A:/14000F.PIP
TIME/DATE OF STUDY: 11:22 09/25/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD{FT}	UPSTREAM RUN PRESSURE+ MOMENTUM{POUNDS}	DOWNSTREAM RUN FLOW DEPTH{FT}	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUN DS)
4009.00-	) FRICTION	0.96	54.24	0.53*	56.99
4015.00-	) CATCH BASIN	0.74*Dc	48.71	0.74*Dc	48.71
4015.00-		1.09*	26.38	0.74 De	17. 11

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS .

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 4009.00 FLOWLINE ELEVATION = 538.29
PIPE FLOW = 3.77 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 539.250 FEET

NODE 4009.00 : **HGL** = < 538.820>;EGL= < 539.528>;FLOWLINE= < 538.290>

FLOW PROCESS FROM NODE 4009.00 TO NODE 4015.00 IS CODE = 1
UPSTREAM NODE 4015.00 ELEVATION = 539.03 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 3.77 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 37.00 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 0.52 CRITICAL DEPTH(FT) = 0.74

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 0.74

GRADUALLY VARIED fLOW PROFILE COMPUTED INfORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT}	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT}	PRESSURE+ MOMENTUM(POUNDS)
0.000	0.742	4.324	1.033	48.71
0.015	0.733	4.393	1.033	48.73
0.061	0.724	4.464	1.033	48.76
0.143	0.715	4.537	1.035	48.82
0.263	0.706	4.612	1.036	48.90
0.425	0.697	4.690	1.038	49.02
0.635	0.688	4.770	1.041	49.15
0.897	0.678	4.854	1.045	49.32
1.219	0.669	4.940	1.049	49.51
1.608	0.660	5.029	1.053	49.74
2.073	0.651	5.121	1.059	49.99
2.626	0.642	5.217	1.065	50.27
3.280	0.633	5.316	1.072	50.59
4.052	0.624	5.418	1.080	50.95
4.964	0.615	5.525	1.089	51.33
6.042	0.606	5.635	1.099	51.76
7.325	0.597	5.750	1.111	52.22
8.860	0.588	5.869	1.123	52.72
10.716	0.579	5.993	1.137	53.27
12.996	0.570	6.121	1.152	53.86
15.856	0.561	6.255	1.169	54.49
19.559	0.552	6.395	1.187	55.17
24.599	0.542	6.540	1.207	55.91
32.084	0.533	6.692	1.229	56.69
37.000	0.530	6.749	1.238	56.99

NODE 4015.00 : **HGL** = < 539.772>;EGL= < 540.063>;FLOWLINE= < 539.030>

****

FLOW PROCESS FROM NODE 4015.00 TO NODE 4015.00 IS CODE 8
UPSTREAM NODE 4015.00 ELEVATION = 539.03 (FLOW IS SUBCRITICAL)

CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD}:
PIPE FLOW = 3.77 CFS PIPE DIAMETER = 18.00 INCHES
FLOW VELOCITY = 4.33 FEET/SEC. VELOCITY HEAD = 0.291 FEET
CATCH BASIN ENERGY LOSS = .2*{VELOCITY HEAD} = .2*(0.291) = 0.058

NODE 4015.00 : **HGL** = < 540.121>;EGL= < 540.121>;FLOWLINE= < 539.030>

****

UPSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 4015.00 FLOWLINE ELEVATION = 539.03
ASSUMED UPSTREAM CONTROL **HGL** = 539.77 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

```
**********  **********  **********
                PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
          (Reference: LACFCD, LACRD, AND OCEMA HYDRAULICS CRITERION)
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            Ver. 8.0  Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                        San Diego, California 92110
                       619-291-0707    Fax 619-291-4165

 ********** DESCRIPTION OF STUDY **********
* McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A  *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 14000 (NODE 14007 TO 14010 LATERAL) *
* 50-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT     *
 ***  **********

  FILE NAME: A:/14000G.PIP
  TIME/DATE OF STUDY: 11:44 09/25/2004

**********  **********
          GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                NODAL POINT STATUS TABLE
           (Note: "*" indicates nodal point data used.)
                  UPSTREAM RUN                DOWNSTREAM RUN
   NODE    MODEL     PRESSURE      PRESSURE+        FLOW         PRESSURE+
  NUMBER   PROCESS   HEAD(FT)   MOMENTUM(POUNDS)   DEPTH(FT)   MOMENTUM(POUNDS)
 4007.00-              1.92*Dc          938.06        1.92*Dc          938.06
        } FRICTION
 4010.00-              2.05*            953.82        1.92 De          938.06
        } CATCH BASIN
 4010.00-              4.34*            654.84        1.92 De          180.17

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
**********  ******
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  4007.00          FLOWLINE ELEVATION =   556.08
 PIPE FLOW =      34.81 CFS      PIPE DIAMETER =  24.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   557.670 FEET
 *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(   1.59 FT.)
        IS LESS THAN CRITICAL DEPTH(   1.92 FT.)
 ===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
      FOR UPSTREAM RUN ANALYSIS

 NODE  4007.00 : HGL = <  557.999>;EGL= <  559.959>;FLOWLINE= <  556.080>

********** **********  ***
 FLOW PROCESS FROM NODE  4007.00 TO NODE  4010.00 IS CODE =  1
 UPSTREAM NODE  4010.00     ELEVATION =   556.72   (FLOW UNSEALS IN REACH)
```

```
 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          34.81 CFS     PIPE DIAMETER =  24.00 INCHES
 PIPE LENGTH =      32.00 FEET          MANNING'S N0.01300
 ===> NORMAL PIPEFLOW IS PRESSURE FLOW

 NORMAL DEPTH(FT) =      2.00           CRITICAL DEPTH(FT) =      1.92

 DOWNSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.92

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)           (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
        0.000          1.919     11.232          3.879           938.06
        0.056          1.922     11.222          3.879           938.07
        0.217          1.925     11.213          3.879           938.09
        0.477          1.928     11.204          3.879           938.12
        0.826          1.932     11.196          3.879           938.17
        1.257          1.935     11.187          3.880           938.23
        1.761          1.938     11.179          3.880           938.31
        2.332          1.941     11.171          3.880           938.41
        2.962          1.945     11.163          3.881           938.52
        3.644          1.948     11.156          3.882           938.64
        4.373          1.951     11.149          3.882           938.78
        5.141          1.954     11.142          3.883           938.94
        5.944          1.958     11.135          3.884           939.12
        6.777          1.961     11.128          3.885           939.31
        7.634          1.964     11.122          3.886           939.52
        8.512          1.967     11.116          3.887           939.75
        9.407          1.971     11.110          3.889           940.00
       10.315          1.974     11.105          3.890           940.28
       11.232          1.977     11.100          3.892           940.57
       12.156          1.980     11.095          3.893           940.89
       13.084          1.984     11.091          3.895           941.23
       14.012          1.987     11.087          3.897           941.61
       14.939          1.990     11.083          3.899           942.01
       15.862          1.993     11.080          3.901           942.45
       16.777          1.997     11.078          3.904           942.94
       17.678          2.000     11.077          3.906           943.49
 ===> FLOW IS UNDER PRESSURE
       32.000          2.053     11.080          3.959           953.82
---------------------------------------  ----------------------------------
 NODE  4010.00 : HGL = <  558.773>;EGL= <  560.679>;FLOWLINE= <  556.720>

**********************  *** ************************  ************************
 FLOW PROCESS FROM NODE  4010.00 TO NODE  4010.00 IS CODE =  8
 UPSTREAM NODE  4010.00     ELEVATION =   556.72   (FLOW IS UNDER PRESSURE)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD}:
 PIPE FLOW =      34.81 CFS          PIPE DIAMETER =  24.00 INCHES
 FLOW VELOCITY =  11.08 FEET/SEC.    VELOCITY HEAD =  1.906 FEET
 CATCH BASIN ENERGY LOSS = .2* (VELOCITY HEAD) = .2*(  1.906) =  0.381

 NODE  4010.00 : HGL = <  561.060>;EGL= <  561.060>;FLOWLINE= <  556.720>

**********************************************  ******* ************** ********
 UPSTREAM PIPE FLOW CONTROL DATA:
```

NODE NUMBER = 4010.00 FLOWLINE ELEVATION = 556.72
ASSUMED UPSTREAM CONTROL **HGL** = 558.64 FOR DOWNSTREAM RUN ANALYSIS

END OF GRADUALLY VARIED FLOW ANALYSIS

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Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* **McMILLIN OTAY RANCH VILLAGE 7** **J-14531A** *
* **PRESSURE PIPE FLOW ANALYSIS AT BASIN 14000 (NODE 14014 TO 14017 LATERAL)** *
* **50-YR STORM EVENT, ULTIMATE CONDITION** **BY:PT** *

FILE NAME: A:/14000X.PIP
TIME/DATE OF STUDY: 11:36 09/25/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT}	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS}
4014.00-	) FRICTION	1.09	74.89	0.62*	77.91
4017.00-	) CATCH BASIN	0.85*Dc	67.83	0.BS*Dc	67.83
4017.00-		1.26*	37.36	0.85 De	23.37

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 4014.00 FLOWLINE ELEVATION = 520.04
PIPE FLOW = 4.86 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL **HGL** = 521.130 FEET

NODE 4014.00 : **HGL** = < 520.656>;EGL= < 521.440>;FLOWLINE= < 520.040>

FLOW PROCESS fROM NODE 4014.00 TO NODE 4017.00 IS CODE = 1
UPSTREAM NODE 4017.00 ELEVATION = 520.30 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 4.86 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH = 4.25 FEET MANNING'S N 0.01300

```
 NORMAL DEPTH(FT) =      0.44          CRITICAL DEPTH(FT) =      0.85

 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     0.85

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)          (FT)    {FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS )
        0.000          0.848      4.720         1.194           67.83
        0.011          0.831      4.834         1.194           67.87
        0.047          0.815      4.954         1.196           67.99
        0.109          0.799      5.080         1.200           68.20
        0.201          0.782      5.213         1.205           68.49
        0.328          0.766      5.354         1.211           68.88
        0.493          0.750      5.503         1.220           69.37
        0.701          0.733      5.659         1.231           69.96
        0.959          0.717      5.825         1.244           70.66
        1.274          0.701      6.001         1.260           71.48
        1.656          0.684      6.188         1.279           72.43
        2.114          0.668      6.386         1.302           73.51
        2.662          0.652      6.597         1.328           74.73
        3.317          0.635      6.821         1.358           76.11
        4.100          0.619      7.061         1.394           77.65
        4.250          0.616      7.101         1.400           77.91
-------------- ---------------------------------------------------------------
 NODE   4017.00 : HGL = <  521.148>;EGL= <  521.494>;FLOWLINE= <  520.300>

**************************************************************************    ******
 FLOW PROCESS FROM NODE  4017.00 TO NODE  4017.00 IS CODE =  8
 UPSTREAM NODE  4017.00     ELEVATION =   520.30   (FLOW IS SUBCRITICAL)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =       4.86 CFS         PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY  =  4.72 FEET/SEC.   VELOCITY HEAD  =  0.346 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.346) =  0.069

 NODE  4017.00 : HGL = <  521.563>;EGL= <  521.563>;FLOWLINE= <  520.300>

************************************************** ***************** **
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  4017.00          FLOWLINE ELEVATION =   520.30
 ASSUMED UPSTREAM CONTROL HGL =    521.15 FOR DOWNSTREAM RUN ANALYSIS

============   ===========================================================;==========
 END OF GRADUALLY VARIED FLOW ANALYSIS
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APPENDIX F

100-Year Pipeflow Results

72" Major outlet Pipe 100-year

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

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DESCRIPTION OF STUDY

McMILLIN OTAY RANCH VILLAGE 7 J-14531A
PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000
100-YR STORM EVENT, ULTIMATE CONDITION BY:PT

FILE NAME: 3000.PIP
TIME/DATE OF STUDY: 15:59 11/11/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
3042.00-	) FRICTION	4.18 De	7424.03	3.12*	8321.94
3041.50-	) JUNCTION	4.18*Dc	7424.03	4.18*Dc	7424.03
3041.50-	) FRICTION+BEND	6.45*	9808.79	4.18 De	7424.03
4041.50-	) FRICTION	15.25*	25325.85	) HYDRAULIC JUMP 1.76	15560.64
3041.00-	) JUNCTION	4.18 De	7424.03	3.73*	7559.71
3041.00-	) FRICTION	6.18	9336.47	1.47*	19696.40
3038.00-	) JUNCTION	4.18 De	7424.03	2.33*	10989.43
3038.00-	) FRICTION	4.12 De	7167.85	2.22*	11020.08
3039.00-	) CATCH BASIN	4.12*Dc	7167.85	4.12*Dc	7167.85
3039.00-		6.36*	5928.73	4.12 De	2349.51

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD, LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 3042.00 FLOWLINE ELEVATION = 422.00
PIPE FLOW = 233.00 CFS PIPE DIAMETER = 72.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 422.000 FEET
*NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH(0.00 FT.)

```
        IS LESS THAN CRITICAL DEPTH(  4.18 FT.)
  ===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
       FOR UPSTREAM RUN ANALYSIS

  NODE   3042.00 : HGL = <  425.115>;EGL= <  428.949>;FLOWLINE= <  422.000>

****************************************************************************   *** ******
  FLOW PROCESS FROM NODE  3042.00 TO NODE  3041.50 IS CODE =  1
  UPSTREAM NODE  3041.50     ELEVATION =   422.93   (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD) :
  PIPE FLOW         233.00 CFS     PIPE DIAMETER =  72.1  INCHES
  PIPE LENGTH =       7.68 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      1.61          CRITICAL DEPTH(FT) =      4.18
================================================   ==========================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     4.18

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL( FT)          (FT)    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
          0.000         4.177     11.084          6.086          7424.03
          0.047         4.075     11.394          6.092          7431.04
          0.190         3.972     11.725          6.108          7451.89
          0.441         3.869     12.081          6.137          7487.49
          0.817         3.767     12.464          6.181          7538.87
          1.335         3.664     12.876          6.240          7607.15
          2.016         3.562     13.319          6.318          7693.62
          2.886         3.459     13.798          6.417          7799.73
          3.976         3.357     14.315          6.541          7927.13
          5.323         3.254     14.874          6.692          8077.70
          6.973         3.151     15.481          6.875          8253.59
          7.680         3.115     15.707          6.949          8321.94
-------------------------------------------------------------------------   -----
  NODE   3041.50 : HGL = <  427.107>;EGL= <  429.016>;FLOWLINE= <  422.930>

****************************************************************************** *****
  FLOW PROCESS FROM NODE  3041.50 TO NODE  3041.50 IS CODE =  5
  UPSTREAM NODE  3041.50     ELEVATION =   423.93   (FLOW IS AT CRITICAL DEPTH)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)   (FT/SEC)
     UPSTREAM      233.00     72.00      90.00     423.93       4.18         8.241
    DOWNSTREAM     233.00     72.00                422.93       4.18        11.079
    LATERAL #1       0.00      0.00       0.00       0.00       0.00         0.000
    LATERAL #2       0.00      0.00       0.00       0.00       0.00         0.000
       QS            0.00===QS EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Q1*V1*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/{(A1+A2)*16.1}+FRICTION LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00303
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00437
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00370
  JUNCTION LENGTH      5.00 FEET
  FRICTION LOSSES     0.018 FEET          ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    {DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    { 2.419)+( 0.000) =    2.419
```

NODE 3041.50 : HGL = < 430.38l>;EGL= < 431.435>;FLOWLINE= < 423.930>

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

FLOW PROCESS FROM NODE 4041.50 TO NODE 4041.50 IS CODE = 3
UPSTREAM NODE 4041.50 ELEVATION = 429.66 (FLOW IS UNDER PRESSURE)

CALCULATE PIPE-BEND LOSSES(OCEMA):
PIPE FLOW = 233.00 CFS PIPE DIAMETER = 72.00 INCHES
CENTRAL ANGLE 31.810 DEGREES MANNING'S N = 0.13000
PIPE LENGTH = 47.47 FEET BEND COEFFICIENT(KB) = 0.14863
FLOW VELOCITY 8.24 FEET/SEC. VELOCITY HEAD = 1.055 FEET
HB=KB*(VELOCITY HEAD) = (0.149)*(1.055) = 0.157
SF=(Q/K)**2 = ((233.00)/(423.510))**2 = 0.30268
HF=L*SF = (47.47)*{0.30268) = 14.368
TOTAL HEAD LOSSES = HB + HF = (0.157)+(14.368) = 14.525

NODE 4041.50 : HGL = < 444.905>;EGL= < 445.960>;FLOWLINE= < 429.660>

********** **********k **********

FLOW PROCESS FROM NODE 3041.50 TO NODE 3041.00 IS CODE = 1
UPSTREAM NODE 3041.00 ELEVATION = 462.50 (HYDRAULIC JUMP OCCURS)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 233.00 CFS PIPE DIAMETER = 72.00 INCHES
PIPE LENGTH = 314.31 FEET MANNING'S N 0.01300

HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

NORMAL DEPTH(FT) = 1.67 CRITICAL DEPTH(FT) = 4.18

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 3.73

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	3.733	12.598	6.199	7559.71
0.520	3.650	12.934	6.250	7617.82
1.165	3.568	13.291	6.313	7687.77
1.952	3.486	13.671	6.389	7770.30
2.898	3.403	14.074	6.481	7866.26
4.026	3.321	14.504	6.589	7976.55
5.360	3.239	14.962	6.717	8102.23
6.932	3.156	15.451	6.866	8244.42
8.776	3.074	15.974	7.039	8404.43
10.937	2.992	16.534	7.239	8583.70
13.466	2.910	17.134	7.471	8783.86
16.430	2.827	17.779	7.739	9006.75
19.908	2.745	18.474	8.048	9254.46
24.003	2.663	19.223	8.404	9529.39
28.843	2.580	20.033	8.816	9834.25
34.599	2.498	20.911	9.292	10172.19
41.495	2.416	21.864	9.843	10546.81
49.840	2.333	22.903	10.483	10962.33
60.071	2.251	24.037	11.228	11423.62
72.830	2.169	25.280	12.098	11936.42
89.121	2.086	26.646	13.118	12507.49
ll0.632	2.004	28.154	14.320	13144.85
140.539	1.922	29.824	15.742	13858.06
185.990	1.839	31.683	17.437	14658.67
269.945	1.757	33.761	19.467	15560.63

```
       314.310          1.757     33.761          19.467          15560.64

  HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS
=============== -================================================; ====== ==
  DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =    15.25
=============== ============================================================
  PRESSURE FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM        PRESSURE   VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)         HEAD(FT)   (FT/SEC)     ENERGY(FT)     MOMENTUM(POUNDS)
          0.000          15.245      8.241          16.300          25325.85
         91.128           6.000      8.241           7.054           9013.86

  ASSUMED DOWNSTREAM PRESSURE HEAD( FT) =     6.00

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL (FT)          (FT)    {FT/SEC)     ENERGY (FT)    MOMENTUM (POUNDS)
         91.128          6.000      8.238          7.054           9013.86
         91.799          5.927      8.257          6.986           8893.96
         92.429          5.854      8.291          6.922           8781.48
         93.031          5.782      8.335          6.861           8674.22
         93.611          5.709      8.388          6.802           8571.53
         94.171          5.636      8.449          6.745           8473.08
         94.711          5.563      8.516          6.690           8378.73
         95.233          5.490      8.590          6.637           8288.39
         95.736          5.418      8.670          6.586           8202.05
         96.221          5.345      8.757          6.536           8119.71
         96.687          5.272      8.849          6.489           8041.41
         97.134          5.199      8.948          6.443           7967.22
         97.560          5.126      9.054          6.400           7897.20
         97.965          5.054      9.165          6.359           7831.46
         98.349          4.981      9.283          6.320           7770.08
         98.709          4.908      9.408          6.283           7713.18
         99.045          4.835      9.540          6.249           7660.89
         99.356          4.762      9.678          6.218           7613.35
         99.638          4.690      9.824          6.189           7570.69
         99.892          4.617      9.978          6.164           7533.08
        100.113          4.544     10.139          6.141           7500.70
        100.301          4.471     10.308          6.122           7473.72
        100.453          4.398     10.486          6.107           7452.34
        100.566          4.326     10.673          6.096           7436.78
        100.636          4.253     10.870          6.089           7427.26
        100.660          4.180     11.076          6.086           7424.03
        314.310          4.180     11.076          6.086           7424.03
-----------------------END OF HYDRAULIC JUMP ANALYSIS-----------------------
 PRESSURE+MOMENTUM BALANCE OCCURS AT    55.20 FEET UPSTREAM OF NODE 3041.50
 DOWNSTREAM DEPTH = 9.645 FEET, UPSTREAM CONJUGATE DEPTH = 1.768 FEET

  NODE   3041.00 : HGL = <   466.233>;EGL= <   468.699>;FLOWLINE= <   462.500>

****************************************************************************   **   *
  FLOW PROCESS FROM NODE   3041.00 TO NODE   3041.00 IS CODE =   5
  UPSTREAM NODE   3041.00     ELEVATION =    462.83   (FLOW IS SUPERCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER   ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH (FT.)   (FT/SEC)
     UPSTREAM      233.00     72.00     67.00     462.83       4.18         43.171
    DOWNSTREAM     233.00     72.00               462.50       4.18         12.602
```

```
   LATERAL #1      0.00     0.00      0.00      0.00      0.00        0.000
   LATERAL #2      0.00     0.00      0.00      0.00      0.00        0.000
      Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA 1)-Q3*V3*COS( DELTA3)-
      Q4*V4*COS(DELTA4) )/( {Al+A2)*16.l)+FRICTION  LOSSES
  UPSTREAM:    MANNING'S N = 0.01300;  FRICTION SLOPE = 0.17253
  DOWNSTREAM:  MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00601
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.08927
  JUNCTION LENGTH     7.00 FEET
  FRICTION LOSSES    0.625 FEET         ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES   (24,546)+( 0.000) =  24.546

  NODE  3041.00 : HGL = <  464.305>;EGL= <  493.245>;FLOWLINE= <  462.830>

*******  ************************************************  ******************
  FLOW PROCESS FROM NODE  3041.00 TO NODE  3038.00 IS CODE =  1
  UPSTREAM NODE  3038.00     ELEVATION =   491.56  (FLOW IS SUPERCRITICAL)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW         233.00 CFS     PIPE DIAMETER =  72.00 INCHES
  PIPE LENGTH =      84.53 FEET          MANNING'S N     0.01300

  NORMAL DEPTH(FT) =      1.25            CRITICAL DEPTH(FT) =      4.18

  UPSTREAM CONTROL ASSUMED FLOW DEPTH(FT) =     2.33

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE fROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL( FT)          (FT)   (FT/SEC)    ENERGY(FT)    MOMENTUM( POUNDS)
         0.000          2.328     22.970        10.526          10989.43
         1.234          2.285     23.557        10.907          11227.71
         2.582          2.242     24.173        11.321          11479.56
         4.057          2.198     24.820        11.770          11745.85
         5.674          2.155     25.499        12.257          12027.56
         7.451          2.112     26.213        12.788          12325.73
         9.407          2.068     26.965        13.366          12641.52
        11.568          2.025     27.756        13.996          12976.18
        13.961          1.982     28.592        14.684          13331.11
        16.621          1.938     29.474        15.436          13707.83
        19.588          1.895     30.406        16.260          14108.03
        22.912          1.852     31.394        17.165          14533.57
        26.655          1.808     32.440        18.160          14986.50
        30.893          1.765     33.551        19.255          15469.14
        35.723          1.722     34.732        20.465          15984.03
        41.271          1.678     35.989        21.803          16534.02
        47.704          1.635     37.330        23.287          17122.31
        55.248          1.592     38.761        24.936          17752.49
        64.221          1.548     40.294        26.775          18428.59
        75.090          1.505     41.936        28.830          19155.20
        84.530          1.475     43.157        30.415          19696.40
 ---------------------------------------------------------------------------
  NODE  3038.00 : HGL = <  493.888>;EGL= <  502.086>;FLOWLINE= <  491.560>

************************  W ***************** W *******  *********** **********  *
  FLOW PROCESS FROM NODE  3038.00 TO NODE  3038.00 IS CODE =  5
  UPSTREAM NODE  3038.00     ELEVATION =   491.89  (FLOW IS SUPERCRITICAL)
```

CALCULATE JUNCTION LOSSES:

PIPE	FLOW (CFS)	DIAMETER (INCHES)	ANGLE (DEGREES)	FLOWLINE ELEVATION	CRITICAL DEPTH (FT.)	VELOCITY (FT/SEC)
UPSTREAM	227.00	72.00	0.00	491.89	4.12	23.798
DOWNSTREAM	233.00	72.00		491.56	4.18	22.977
LATERAL n	5.50	30.00	90.00	495.39	0.77	4.247
LATERAL jj.2	0.50	18.00	90.00	496.39	0.26	2.418
Q5	O.OO===Q5 EQUALS BASIN INPUT===					

LACFCD AND OCEMA FLOW JUNCTION fORMULAE USED:
DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
UPSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.03347
DOWNSTREAM: MANNING'S N = 0.01300; FRICTION SLOPE = 0.02980
AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.03163
JUNCTION LENGTH 7.00 FEET
FRICTION LOSSES 0.221 FEET ENTRANCE LOSSES 0.000 FEET
JUNCTION LOSSES (DY+HV1-HV2)+(ENTRANCE LOSSES)
JUNCTION LOSSES (0.823)+(0.000) = 0.823

NODE 3038.00 : HGL = < 494.115>;EGL= < 502.909>;FLOWLINE= < 491.890>

********** ********** **********
FLOW PROCESS FROM NODE 3038.00 TO NODE 3039.00 IS CODE = 1
UPSTREAM NODE 3039.00 ELEVATION = 500.00 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES(LACFCD):
PIPE FLOW 227.00 CFS PIPE DIAMETER = 72.00 INCHES
PIPE LENGTH = 142.23 FEET MANNING'S N 0.01300

NORMAL DEPTH(FT) = 1.93 CRITICAL DEPTH(FT) = 4.12

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 4.12

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	4.125	10.950	5.988	7167.85
0.072	4.037	11.215	5.992	7172.66
0.299	3.949	11.498	6.003	'7187.43
0.699	3.862	11.797	6.024	7212.74
1.295	3.774	12.116	6.055	7249.18
2.112	3.686	12.456	6.097	7297.43
3.179	3.599	12.817	6.151	7358.25
4.533	3.511	13.203	6.219	7432.47
6.215	3.423	13.615	6.303	7521.01
8.277	3.335	14.055	6.405	7624.90
10.779	3.248	14.526	6.526	7745.30
13.799	3.160	15.031	6.671	7883.52
17.429	3.072	15.574	6.841	8041.01
21.788	2.985	16.157	7.041	8219.45
27.027	2.897	16.786	7.275	8420.'70
33.341	2.809	17.465	7.549	8646.92
40.991	2.722	18.200	7.868	8900.58
50.333	2.634	18.997	8.241	9184.51
61.870	2.546	19.863	8.677	9501.97
76.342	2.458	20.809	9.186	9856.76
94.903	2.371	21.842	9.783	10253.34
119.494	2.283	22.976	10.485	10696.90
142.230	2.225	23.791	11.019	11020.08

```
  NODE   3039.00  : HGL = <   504.125>;EGL=  <   505.988>;FLOWLINE=  <   500.000>

**********************************    ****************************************
  FLOW  PROCESS  FROM  NODt  3039.00  TO  NODE   3039.00  IS CODE =   8
  UPSTREAM  NODE   3039.00      ELEVATION  =    500.00   (FLOW IS AT CRITICAL  DEPTH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES{LACFCD):
  PIPE  FLOW  =      227.00 CFS           PIPE  DIAMETER  =   72.00  INCHES
  FLOW  VELOCITY   =  10.95  FEET/SEC.   VELOCITY  HEAD  =   1.863 FEET
  CATCH  BASIN  ENERGY  LOSS  =  .2*{VELOCITY  HEAD)  =  .2*(   1.863) =   0.373

  NODE   3039.00  : HGL = <   506.360>;EGL=  <   506.360>;FLOWLINE= <   500.000>

******* ********  ***** ************************************************************
  UPSTREAM  PIPE  FLOW  CONTROL  DATA:
  NODE  NUMBER  =   3039.00              FLOWLINE ELEVATION =    500.00
  ASSUMED UPSTREAM CONTROL HGL =     504.12  FOR  DOWNSTREAM  RUN  ANALYSIS


  END OF GRADUALLY VARIED  FLOW ANALYSIS
```

SYSTEM 3000b

18" lateral 3040 100-year

```
**********************************  ******************** ******** * ***************
                PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
           (Reference: LACFCD,LACRD, AND OCEMA HYDRAULICS CRITERION)
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 8.0  Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707    Fax 619-291-4165

  ************************** DESCRIPTION OF STUDY **************************
   * McMILLIN OTAY RANCH VILLAGE 7                                  J-14531A   *
   * PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000 (NODE 3038 TO 10002 LATERAL) *
   * 100-YR STORM EVENT, ULTIMATE CONDITION                          BY:PT   *
  **************************************************************************

   FILE NAME: 3000B.PIP
   TIME/DATE OF STUDY: 16:40 11/11/2004

*****************************************************************************
                GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                          NODAL POINT STATUS TABLE
                  (Note: "*" indicates nodal point data used.)
                        UPSTREAM RUN                    DOWNSTREAM RUN
    NODE     MODEL    PRESSURE       PRESSURE+          FLOW          PRESSURE+
   NUMBER   PROCESS  HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOMENTUM(POUNDS)
  3038.00-              1.35 De 257.52                   0.80*             352.02
         } FRICTION
  3040.00-              1.35*De          257.52         l.35*Dc           257.52
         } JUNCTION
  3040.00-              2.86*            413.38         0.77              370.39
         } FRICTION         ) HYDRAULIC JUMP
  1000.20-              l.35*Dc          257.52         l.35*Dc           257.52
         } CATCH BASIN
  1000.20-              2.45*            187.15         1.35 De            66.09

  MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

  NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
  CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
  DESIGN MANUALS.
*****************************************************************************
  DOWNSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3038.00            FLOWLINE ELEVATION =   496.39
  PIPE FLOW =      12.85 CFS        PIPE DIAMETER =  18.00 INCHES
  ASSUMED DOWNSTREAM CONTROL HGL =  494.100 FEET
  *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH( -2.29 FT.)
         IS LESS THAN CRITICAL DEPTH(  1.35 FT.)
  ===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
       FOR UPSTREAM RUN ANALYSIS

  NODE  3038.00 : HGL = <  497.195>;EGL= <  499.943>;FLOWLINE= <  496.390>

****************************************************************************    *** ***
  FLOW PROCESS FROM NODE  3038.00 TO NODE  3040.00 IS CODE =  1
  UPSTREAM NODE  3040.00     ELEVATION =   503.07   (FLOW IS SUPERCRITICAL)
```

```
  CALCULATE  FRICTION  LOSSES(LACFCD} :
  PIPE FLOW          12.85 CFS     PIPE DIAMETER =  18.00  INCHES
  PIPE LENGTH =     129.02 FEET          MANNING'S N      0.01300

  NORMAL  DEPTH(FT) =      0.78           CRITICAL  DEPTH(FT) =      1.35
================================================== ====================
  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT} =     1.35

  GRADUALLY  VARIED  FLOW  PROFILE  COMPUTED  INFORMATION:

  DISTANCE  FROM       FLOW  DEPTH   VELOCITY       SPECIFIC         PRESSURE+
   CONTROL( FT)            (FT)     (FT/SEC}     ENERGY(FT)     MOMENTUM(POUNDS}
          0.000           1.346       7.685          2.264            257.52
          0.030           1.323       7.784          2.265            257.64
          0.122           1.301       7.891          2.268            258.00
          0.279           1.278       8.006          2.274            258.60
          0.507           1.256       8.130          2.283            259.45
          0.811           1.233       8.263          2.294            260.56
          1.200           1.211       8.404          2.308            261.92
          1.680           1.188       8.556          2.326            263.56
          2.265           1.166       8.717          2.346            265.49
          2.966           1.143       8.888          2.371            267.71
          3.801           1.121       9.071          2.399            270.24
          4.787           1.098       9.265          2.432            273.10
          5.950           1.076       9.471          2.469            276.31
          7.321           1.053       9.690          2.512            279.88
          8.937           1.031       9.923          2.561            283.84
         10.849           1.008      10.170          2.615            288.21
         13.122           0.986      10.434          2.677            293.02
         15.848           0.963      10.714          2.747            298.30
         19.153           0.941      11.013          2.825            304.08
         23.222           0.918      11.331          2.913            310.40
         28.345           0.896      11.671          3.012            317.30
         35.008           0.873      12.035          3.123            324.82
         44.120           0.851      12.423          3.249            333.03
         57.729           0.828      12.840          3.390            341.97
         82.406           0.806      13.286          3.548            351.72
        129.020           0.805      13.300          3.553            352.02

  NODE   3040.00 : HGL = <  504.416>;EGL= <  505.334>;FLOWLINE= <  503.070>

************************************************************************   *** ***** ***
  FLOW PROCESS FROM NODE  3040.00 TO NODE  3040.00 IS CODE =  5
  UPSTREAM  NODE  3040.00     ELEVATION =   503.40   (FLOW UNSEALS  IN REACH}

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                   (CFS)    (INCHES) (DEGREES) ELEVATION   DEPTH(FT.}   (FT/SEC)
     UPSTREAM      12.85      18.00      90.00     503.40       1.35         7.272
    DOWNSTREAM     12.85      18.00                503.07       1.35         7.688
    LATERAL #1      0.00       0.00       0.00       0.00       0.00         0.000
    LATERAL #2      0.00       0.00       0.00       0.00       0.00         0.000
       QS           0.00===Q5 EQUALS  BASIN  IN PUT===

  LACFCD AND OCEMA FLOW JUNCTION  FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1} -Q3*V3*COS(DELTA3} -
      Q4 *V4*COS(DELTA4))/( (Al+A2}*16.l}+FRICTION  LOSSES
  UPSTREAM:     MANNING'S  N  = 0.01300;  FRICTION  SLOPE  = 0.01496
  DOWNSTREAM:   MANNING'S  N  = 0.01300;  FRICTION  SLOPE  = 0.01321
  AVERAGED  FRICTION  SLOPE  IN  JUNCTION  ASSUMED  AS  0.01409
  JUNCTION  LENGTH  =   4.00 FEET
```

```
  FRICTION  LOSSES     0.056 FEET          ENTRANCE  LOSSES     0.000 FEET
  JUNCTION  LOSSES    (DY+HV1-HV2)+(ENTRANCE  LOSSES)
  JUNCTION  LOSSES    ( 1.744)+( 0.000) =    1.744

  NODE   3040.00 : HGL = <  506.257>;EGL= <  507.078>;FLOWLINE=  <  503.400>

**k****************   ************************************************************
  FLOW PROCESS FROM NODE  3040.00 TO NODE  1000.20  IS CODE =  1
  UPSTREAM  NODE  1000.20     ELEVATION =   509.50  (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW           12.85 CFS     PIPE DIAMETER =  18.00 INCHES
  PIPE LENGTH = .     98.87 FEET          MANNING'S N     0.01300

  HYDRAULIC  JUMP:  DOWNSTREAM  RUN  ANALYSIS  RESULTS

  NORMAL  DEPTH(FT) =      0.74           CRITICAL  DEPTH(FT} =      1.35
=========================================================================      ==== =
  UPSTREAM  CONTROL  ASSUMED  FLOWDEPTH( FT}        1.35

  GRADUALLY  VARIED  FLOW  PROFILE  COMPUTED  INFORMATION:
-----------------------------------------   -------------------------------
  DISTANCE  FROM       FLOW  DEPTH   VELOCITY       SPECIFIC         PRESSURE+
   CONTROL(FT)           (FT}     (FT/SEC)      ENERGY( FT)     MOMENTUM(POUNDS)
         0.000          1.346       7.685           2.264            257.52
         0.027          1.322       7.791           2.265            257.66
         0.111          1.298       7.906           2.269            258.07
         0.255          1.274       8.031           2.276            258.76
         0.463          1.250       8.166           2.286            259.74
         0.742          1.225       8.312           2.299            261.01
         1.098          1.201       8.467           2.315            262.58
         1.539          1.177       8.634           2.336            264.48
         2.078          1.153       8.812           2.360            266.71
         2.725          1.129       9.003           2.388            269.28
         3.496          1.105       9.206           2.422            272.23
         4.410          1.081       9.424           2.461            275.56
         5.491          1.057       9.655           2.505            279.31
         6.767          1.033       9.903           2.556            283.50
         8.276          1.008      10.167           2.615            288.15
        10.066          0.984      10.449           2.681            293.31
        12.201          0.960      10.751           2.756            299.01
        14.768          0.936      11.075           2.842            305.29
        17.890          0.912      11.421           2.939            312.20
        21.746          0.888      11.792           3.049            319.79
        26.618          0.864      12.191           3.173            328.11
        32.973          0.840      12.620           3.314            337.24
        41.696          0.816      13.082           3.475            347.24
        54.770          0.792      13.581           3.657            358.22
        78.565          0.767      14.120           3.865            370.26
        98.870          0.767      14.126           3.868            370.39

  HYDRAULIC  JUMP:  UPSTREAM  RUN  ANALYSIS  RESULTS
======== ================================  ======= ============================
  DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =     2.86
=============================================================================
  PRESSURE  FLOW  PROFILE  COMPUTED  INFORMATION:

  DISTANCE  FROM       PRESSURE    VELOCITY       SPECIFIC         PRESSURE+
   CONTROL( FT) ·       HEAD IFT)   (FT/SEC)      ENERGY (rT)     MOMENTUM(POUNDS}
         0.000          2.857       7.272           3.678            413.38
        29.031          1.500       7.272           2.321            263.78
```

```
 ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =     1.50
```

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY(FT)	PRESSURE+ MOMENTUM(POUNDS)
29.031	1.500	7.269	2.321	263.78
29.146	1.494	7.273	2.316	263.18
29.247	1.488	7.279	2.311	262.65
29.340	1.482	7.286	2.306	262.16
29.425	1.475	7.295	2.302	261.71
29.504	1.469	7.306	2.298	261.29
29.578	1.463	7.317	2.295	260.90
29.646	1.457	7.330	2.292	260.54
29.711	1.451	7.343	2.288	260.20
29.770	1.445	7.357	2.286	259.88
29.826	1.438	7.372	2.283	259.59
29.877	1.432	7.388	2.280	259.31
29.925	1.426	7.405	2.278	259.06
29.969	1.420	7.422	2.276	258.83
30.009	1.414	7.441	2.274	258.62
30.046	1.408	7.459	2.272	258.43
30.079	1.401	7.479	2.271	258.25
30.108	1.395	7.499	2.269	258.10
30.135	1.389	7.520	2.268	257.96
30.157	1.383	7.542	2.267	257.85
30.176	1.377	7.564	2.266	257.75
30.192	1.371	7.587	2.265	257.67
30.204	1.364	7.611	2.264	257.60
30.213	1.358	7.635	2.264	257.56
30.218	1.352	7.660	2.264	257.53
30.220	1.346	7.685	2.264	257.52
98.870	1.346	7.685	2.264	257.52

```
-------------------------END OF HYDRAULIC JUMP ANALYSIS-------------------------
 PRESSURE+MOMENTUM BALANCE OCCURS AT     8.35 FEET UPSTREAM OF NODE 3040.00
       DOWNSTREAM DEPTH = 2.466 FEET, UPSTREAM CONJUGATE DEPTH = 0.767 FEET

  NODE   1000.20 : HGL = <  510.846>;EGL= <  511.764>;FLOWLINE= <  509.500>

**** *** * ********************** * * * ************************ *** * *** * * ** * *** * *
  FLOW PROCESS FROM NODE  1000.20 TO NODE  1000.20 IS CODE =  8
  UPSTREAM NODE  1000.20     ELEVATION =   509.50  (FLOW UNSEALS IN REACH)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
  PIPE FLOW =       12.85 CFS        PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  7.69 FEET/SEC.  VELOCITY HEAD =  0.918 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD} = .2*(  0.918) =  0.184

  NODE   1000.20 : HGL = <  511.947>;EGL= <  511.947>;FLOWLINE= <  509.500>

************************ **** ********** * ******* *********** ******* ********* *****
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  1000.20            FLOWLINE ELEVATION =   509.50
  ASSUMED UPSTREAM CONTROL HGL =    510.85 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

SYSTEM 3000c

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
(Reference: LACFCD, LACRD, AND OCEMA HYDRAULICS CRITERION)
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Ver. 8.0 Release Date: 01/01/2003 License ID 1261

Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* McMILLIN OTAY RANCH VILLAGE 7 J-14531A *
* PRESSURE PIPE FLOW ANALYSIS BASIN 3000 (NODE 3038 TO 3005 LATERAL) *
* 100-YR STORM EVENT, ULTIMATE CONDITION BY: PT *

FILE NAME: 3000C.PIP
TIME/DATE OF STUDY: 08:46 11/15/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
(Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD(FT)	UPSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM RUN FLOW DEPTH(FT)	DOWNSTREAM RUN PRESSURE+ MOMENTUM(POUNDS)
3038.00-		2.19 De	1078.86	1.53*	1270.18
)	FRICTION				
3027.00-		2.19*De	1078.86	2.19*De	1078.86
)	JUNCTION				
3027.00-		3.32*	1000.12	1.06	955.87
)	FRICTION	} HYDRAULIC JUMP			
3026.00-		1.88 De	660.29	1.06*	954.93
)	FRICTION+BEND				
3026.00-		1.88 De	660.29	1.08*	940.38
}	JUNCTION				
3026.00-		1.88 De	660.29	1.09*	931.25
)	FRICTION+ BEND				
3025.00-		1.88 De	660.29	1.11*	911.47
)	FRICTION				
3025.00-		1.88 De	660.29	1.43*	728.50
)	JUNCTION				
3025.00-		1.88 De	660.29	1.61*	681.92
)	FRICTION				
3024.00-		l.88*Dc	660.29	l.88*Dc	660.29
)	JUNCTION				
3024.00-		3.21*	964.85	1.88 De	660.29

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA DESIGN MANUALS.

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

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER 3038.00 FLOWLINE ELEVATION = 495.39
PIPE FLOW = 43.06 CFS PIPE DIAMETER = 30.00 INCHES

```
 ASSUMED DOWNSTREAM CONTROL HGL =   494.115 FEET
 *NOTE: ASSUMED DOWNSTREAM CONTROL DEPTH( -1.28 FT.)
        IS LESS THAN CRITICAL DEPTH ( 2.19 FT.)
 ===> CRITICAL DEPTH IS ASSUMED AS DOWNSTREAM CONTROL DEPTH
      FOR UPSTREAM RUN ANALYSIS

 NODE  3038.00 : HGL = <  496.922>;EGL= <  499.818>;FLOWLINE= <  495.390>

****************************************************************************
 FLOW PROCESS FROM NODE  3038.00 TO NODE  3027.00 IS CODE =  1
 UPSTREAM NODE  3027.00     ELEVATION =   497.77  (FLOW IS SUPERCRITICAL)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW          43.06 CFS     PIPE DIAMETER =  30.00 INCHES
 PIPE LENGTH =      83.28 FEET          MANNING'S N     0.01300

 NORMAL DEPTH(FT) =      1.43           CRITICAL DEPTH(FT) =      2.19

 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     2.19

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:
----------------------------------------------------------------------------
 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
  CONTROL(FT)         (FT}    (FT/SEC)     ENERGY(FT)    MOMENTUM(POUNDS)
        0.000         2.189      9.446         3.575          1078.86
        0.069         2.159      9.553         3.577          1079.23
        0.270         2.128      9.668         3.580          1080.25
        0.611         2.098      9.789         3.587          1081.96
        1.104         2.067      9.918         3.595          1084.35
        1.761         2.037     10.053         3.607          1087.46
        2.598         2.006     10.196         3.621          1091.29
        3.635         1.975     10.347         3.639          1095.88
        4.894         1.945     10.505         3.660          1101.25
        6.402         1.914     10.672         3.684          1107.43
        8.193         1.884     10.848         3.712          1114.45
       10.305         1.853     11.032         3.744          1122.34
       12.790         1.823     11.225         3.781          1131.14
       15.707         1.792     11.429         3.822          1140.89
       19.136         1.762     11.643         3.868          1151.63
       23.178         1.731     11.868         3.920          1163.41
       27.965         1.701     12.104         3.977          1176.29
       33.680         1.670     12.352         4.041          1190.32
       40.576         1.640     12.613         4.112          1205.56
       49.028         1.609     12.888         4.190          1222.08
       59.614         1.579     13.178         4.277          1239.94
       73.308         1.548     13.483         4.373          1259.24
       83.280         1.532     13.653         4.428          1270.18
---    ----------------------------------------------------------------------
 NODE  3027.00 : HGL = <  499.959>;EGL= <  501.345>;FLOWLINE= <  497.770>

**************************************** ********************* ******************
 FLOW PROCESS FROM NODE  3027.00 TO NODE  3027.00 IS CODE =  5
 UPSTREAM NODE  3027.00     ELEVATION =   498.10  (FLOW UNSEALS IN REACH)

 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE  CRITICAL     VELOCITY
                  (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
    UPSTREAM      30.40      30.00       0.00     498.10      1.88         6.193
   DOWNSTREAM     43.06      30.00                497.77      2.19         9.443
   LATERAL #1      6.78      18.00      90.00     498.91      1.01         3.837
   LATERAL lt2     5.89      18.00      90.00     498.91      0.94         3.333
```

```
      Q5           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/( (Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00549
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00997
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00773
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES     0.031 FEET         ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 0.674)+( 0.000) =    0.674

  NODE   3027.00  : HGL = <  501.424>;EGL= <  502.020>;FLOWLINE=  <  498.100>

************************************************************     ***************
  FLOW PROCESS FROM NODE  3027.00 TO NODE  3026.00 IS CODE =  1
  UPSTREAM NODE  3026.00     ELEVATION =   501.00  (HYDRAULIC JUMP OCCURS)

  CALCULATE FRICTION LOSSES(LACFCD):
  PIPE FLOW          30.40 CFS     PIPE DIAMETER =  30.00 INCHES
  PIPE LENGTH =      74.77 FEET          MANNING'S N     0.01300

  HYDRAULIC JUMP: DOWNSTREAM RUN ANALYSIS RESULTS

  NORMAL DEPTH(FT) =      1.06            CRITICAL DEPTH(FT) =      1.88

  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =      1.06

  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC        PRESSURE+
   CONTROL( FT)          (FT)    (FT/SEC}    ENERGY( FT)    MOMENTUM(POUND S)
         0.000          1.064      15.263          4.684           954.93
         2.490          1.064      15.264          4.684           954.98
         5.087          1.064      15.265          4.685           955.04
         7.799          1.064      15.266          4.685           955.09
        10.638          1.064      15.267          4.686           955.14
        13.615          1.064      15.268          4.686           955.20
        16.745          1.064      15.269          4.686           955.25
        20.045          1.064      15.271          4.687           955.30
        23.534          1.064      15.272          4.687           955.36
        27.235          1.064      15.273          4.688           955.41
        31.175          1.063      15.274          4.688           955.46
        35.388          1.063      15.275          4.689           955.51
        39.913          1.063      15.276          4.689           955.57
        44.801          1.063      15.277          4.689           955.62
        50.115          1.063      15.278          4.690           955.67
        55.935          1.063      15.279          4.690           955.73
        62.369          1.063      15.280          4.691           955.78
        69.563          1.063      15.281          4.691           955.83
        74.770          1.063      15.281          4.691           955.87

  HYDRAULIC JUMP: UPSTREAM RUN ANALYSIS RESULTS
=============================================== ================Z=================
  DOWNSTREAM CONTROL ASSUMED PRESSURE HEAD(FT) =      3.32
======================    ========================================  =====
  PRESSURE FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM       PRESSURE    VELOCITY      SPECIFIC        PRESSURE+
   CONTROL(FT)        HEAD (FT)   (FT/SEC)     ENERGY(FT)     MOMENTUM( POUNDS)
```

```
        0.000          3.324       6.193          3.920          1000.12
       24.740          2.500       6.193          3.096           747.72
================================================ ======== ==================
  ASSUMED DOWNSTREAM PRESSURE HEAD(FT) =    2.50
==================== ============================================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC       PRESSURE+
   CONTROL(FT)         (FT)     (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
        24.740         2.500       6.191         3.096          747.72
        25.422         2.475       6.202         3.073          740.73
        26.048         2.450       6.221         3.052          734.27
        26.640         2.425       6.245         3.031          728.17
        27.203         2.401       6.274         3.012          722.37
        27.741         2.376       6.308         2.994          716.85
        28.256         2.351       6.345         2.977          711.60
        28.749         2.326       6.386         2.960          706.59
        29.221         2.301       6.430         2.944          701.84
        29.672         2.276       6.477         2.928          697.33
        30.102         2.252       6.528         2.914          693.06
        30.512         2.227       6.581         2.900          689.04
        30.901         2.202       6.638         2.887          685.26
        31.268         2.177       6.698         2.874          681.72
        31.613         2.152       6.761         2.863          678.44
        31.936         2.127       6.827         2.852          675.41
        32.234         2.103       6.897         2.842          672.64
        32.508         2.078       6.969         2.832          670.13
        32.756         2.053       7.045         2.824          667.89
        32.977         2.028       7.125         2.817          665.92
        33.169         2.003       7.208         2.810          664.23
        33.331         1.978       7.294         2.805          662.84
        33.461         1.954       7.384         2.801          661.73
        33.556         1.929       7.478         2.798          660.94
        33.616         1.904       7.576         2.796          660.45
        33.636         1.879       7.678         2.795          660.29
        74.770         1.879       7.678         2.795          660.29
-----------------------END OF HYDRAULIC JUMP ANALYSIS----------------------
 PRESSORE+MOMENTUM BALANCE OCCURS AT     4.34 FEET UPSTREAM OF NODE 3027.00
       DOWNSTREAM DEPTH = 3.179 FEET, UPSTREAM CONJUGATE DEPTH = 1.063 FEET

  NODE   3026.00 : HGL = <  502.065>;EGL= <  505.685>;FLOWLINE= <  501.001>

****************************************************************************
  FLOW PROCESS FROM NODE  3026.00 TO NODE  3026.00 IS CODE =  3
  UPSTREAM NODE  3026.00     ELEVATION =   506.90  (FLOW IS SUPERCRITICAL)

  CALCULATE PIPE-BEND LOSSES(OCEMA):
  PIPE FLOW =      30.40 CFS              PIPE DIAMETER    30.00 INCHES
  CENTRAL ANGLE = 18.500 DEGREES          MANNING'S N = 0.01300
  PIPE LENGTH =     152.10 FEET

  NORMAL DEPTH(FT)=      1.06             CRITICAL DEPTH(FT) =     1.88

  UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =    1.08
==========  ==========     ========================================
  GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

  DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC       PRESSURE+
   CONTROL(FT)         (FT)     (FT/SEC)    ENERGY(FT)    MOMENTUM(POUNDS)
        0.000          1.079      14.985         4.568          940.38
        2.427          1.078      14.997         4.573          941.00
```

```
        4.960          1.078          15.009          4.578          941.62
        7.609          1.077          15.021          4.583          942.25
       10.385          1.076          15.033          4.587          942.87
       13.299          1.076          15.045          4.592          943.50
       16.366          1.075          15.057          4.597          944.12
       19.603          1.074          15.069          4.602          944.75
       23.029          1.074          15.081          4.607          945.38
       26.667          1.073          15.093          4.612          946.01
       30.544          1.072          15.105          4.617          946.64
       34.694          1.072          15.117          4.622          947.27
       39.157          1.071          15.129          4.628          947.91
       43.982          1.070          15.141          4.633          948.54
       49.233          1.070          15.153          4.638          949.18
       54.992          1.069          15.166          4.643          949.81
       61.366          1.069          15.178          4.648          950.45
       68.500          1.068          15.190          4.653          951.09
       76.596          1.067          15.202          4.658          951.73
       85.954          1.067          15.215          4.663          952.37
       97.034          1.066          15.227          4.668          953.01
      110.611          1.065          15.239          4.674          953.66
      128.137          1.065          15.251          4.679          954.30
      152.100          1.064          15.263          4.684          954.93
--------------------------------------------------------------------------------
  NODE   3026.00 : HGL = <  507.981>;EGL= <  511.470>;FLOWLINE= <  506.902>

**************************************** ********************************** **
  FLOW PROCESS FROM NODE  3026.00 TO NODE  3026.00 IS CODE =  5
  UPSTREAM NODE  3026.00     ELEVATION =   507.23  (FLOW IS SUPERCRITICAL)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW     DIAMETER    ANGLE     FLOWLINE  CRITICAL     VELOCITY
                   (CFS)    (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
     UPSTREAM       30.40     30.00       0.00     507.23      1.88        14.813
    DOWNSTREAM      30.40     30.00                506.90      1.88        14.989
    LATERAL #1       0.00      0.00       0.00       0.00      0.00         0.000
    LATERAL #2       0.00      0.00       0.00       0.00      0.00         0.000
       Q5            0.00,,,,==Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION   LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.03558
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.03674
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.03616
  JUNCTION LENGTH     4.00 FEET
  FRICTION LOSSES    0.145 FEET         ENTRANCE LOSSES    0.000 FEET
  JUNCTION LOSSES   (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES   ( 0.256)+( 0.000) =   0.256

  NODE   3026.00 : HGL = <  508.319>;EGL= <  511.726>;FLOWLINE= <  507.230>

************************************************************** **** ********
  FLOW PROCESS FROM NODE  3026.00 TO NODE  3025.00 IS CODE =  3
  UPSTREAM NODE  3025.00     ELEVATION =   511.52  (FLOW IS SUPERCRITICAL)

  CALCULATE PIPE-BEND LOSSES(OCEMA):
  PIPE FLOW =      30.40 CFS            PIPE DIAMETER    30.00  INCHES
  CENTRAL ANGLE = 14.480 DEGREES        MANNING'S N = 0.01300
  PIPE LENGTH =     119.10 FEET

  NORMAL DEPTH(FT) =      1.09          CRITICAL DEPTH(FT) =      1.88
```

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.11

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT}	VELOCITY (FT/SEC}	SPECIFIC ENERGY(fT}	PRESSURE+ MOMENTUM(POUN DS)
0.000	1.111	14.425	4.344	911.47
2.415	1.110	14.442	4.350	912.37
4.937	1.109	14.460	4.357	913.26
7.577	1.108	14.477	4.364	914.17
10.344	1.107	14.495	4.371	915.07
13.251	1.106	14.512	4.378	915.97
16.314	1.105	14.530	4.385	916.88
19.548	1.104	14.548	4.392	917.79
22.973	1.102	14.566	4.399	918.71
26.612	1.101	14.583	4.406	919.62
30.494	1.100	14.601	4.413	920.54
34.651	1.099	14.619	4.420	921.46
39.124	1.098	14.637	4.427	922.39
43.965	1.097	14.655	4.434	923.31
49.236	1.096	14.673	4.442	924.24
55.021	1.095	14.691	4.449	925.17
61.428	1.094	14.709	4.456	926.11
68.603	1.093	14.727	4.463	927.04
76.752	1.092	14.746	4.471	927.98
86.176	1.091	14.764	4.478	928.93
97.343	1.090	14.782	4.485	929.87
111.036	1.089	14.800	4.493	930.82
119.100	1.089	14.809	4.496	931.25

NODE 3025.00 : HGL = < 512.629>;EGL= < 515.862>;FLOWLINE= < 511.518>

****

FLOW PROCESS FROM NODE 3025.00 TO NODE 3025.00 IS CODE = 1
UPSTREAM NODE 3025.00 ELEVATION = 516.21 (FLOW IS SUPERCRITICAL)

CALCULATE FRICTION LOSSES (LACFCD):
PIPE FLOW 30.40 CFS PIPE DIAMETER = 30.00 INCHES
PIPE LENGTH = 130.31 FEET MANNING'S N 0.013000

NORMAL DEPTH(FT} = 1.09 CRITICAL DEPTH(FT) = 1.88

UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) = 1.43

GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

DISTANCE FROM CONTROL(FT)	FLOW DEPTH (FT)	VELOCITY (FT/SEC)	SPECIFIC ENERGY (FT)	PRESSURE+ MOMENTUM(POUNDS)
0.000	1.429	10.475	3.134	728.50
1.249	1.416	10.599	3.161	733.37
2.597	1.402	10.727	3.190	738.45
4.054	1.388	10.858	3.220	743.75
5.631	1.374	10.993	3.252	749.29
7.341	1.361	11.131	3.286	755.06
9.197	1.347	11.272	3.321	761.08
11.216	1.333	11.418	3.359	767.35
13.418	1.319	11.567	3.398	773.88
15.825	1.305	11.721	3.440	780.68
18.466	1.292	11.878	3.484	787.76
21.373	1.278	12.040	3.530	795.12

```
        24.588          1.264      12.207          3.579           802.78
        28.161          1.250      12.378          3.631           810.74
        32.156          1.237      12.554          3.685           819.02
        36.655          1.223      12.735          3.743           827.63
        41.766          1.209      12.922          3.803           836.58
        47.637          1.195      13.114          3.867           845.88
        54.471          1.181      13.311          3.935           855.55
        62.572          1.168      13.515          4.006           865.59
        72.405          1.154      13.724          4.081           876.03
        84.754          1.140      13.940          4.160           886.88
       101.086          1.126      14.163          4.243           898.14
       124.699          1.113      14.393          4.331           909.85
       130.310          1.111      14.425          4.344           911.47
 -------'------------------------------------------------------------------
 NODE   3025.00 : HGL = <  517.639>;EGL= <  519.344>;FLOWLINE= <  516.210>

**************   ****************************************************************
 FLOW PROCESS FROM NODE  3025.00 TO NODE  3025.00 IS CODE =  5
 UPSTREAM NODE  3025.00     ELEVATION =   516.54  (FLOW IS SUPERCRITICAL)

 CALCULATE JUNCTION LOSSES:
      PIPE        FLOW    DIAMETER    ANGLE     FLOWLINE    CRITICAL    VELOCITY
                  (CFS)   (INCHES) (DEGREES) ELEVATION   DEPTH(FT.)  (FT/SEC)
    UPSTREAM      30.40    30.00       0.00    516.54       1.88         9.081
   DOWNSTREAM     30.40    30.00               516.21       1.88        10.478
   LATERAL n       0.00     0.00       0.00      0.00       0.00         0.000
   LATERAL  2      0.00     0.00       0.00      0.00       0.00         0.000
      Q5           O.OO===Q5 EQUALS BASIN INPUT===

 LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
 DY=(Q2*V 2-Ql*Vl*COS( DELTA1)-Q3*V3*COS(DELTA3)-
     Q4*V4*COS( DELTA4 ))/( (Al+A2)*16.l)+FRICTION  LOSSES
 UPSTREAM:    MANNING'S  N  = 0.01300;  FRICTION  SLOPE  = 0.00982
 DOWNSTREAM:  MANNING'S  N  = 0.01300;  FRICTION  SLOPE  = 0.01414
 AVERAGED  FRICTION  SLOPE IN JUNCTION ASSUMED AS 0.01198
 JUNCTION  LENGTH     4.00 FEET
 FRICTION  LOSSES    0.048 FEET         ENTRANCE  LOSSES    0.000 FEET
 JUNCTION  LOSSES   (DY+HV1-HV2)+(ENTRANCE  LOSSES)
 JUNCTION LOSSES    ( 0.089)+( 0.000) =   0.089

 NODE   3025.00 : HGL = <  518.152>;EGL= <  519.433>;FLOWLINE= <  516.540>

 *****.***************************************************************************
 FLOW PROCESS FROM NODE  3025.00 TO NODE  3024.00  IS CODE =  1
 UPSTREAM NODE  3024.00     ELEVATION =   519.47  (FLOW IS SUPERCRITICAL)

 CALCULATE  FRICTION  LOSSES(LACFCD):
 PIPE FLOW          30.40 CFS     PIPE DIAMETER =  30.00 INCHES
 PIPE LENGTH =     293.27 FEET          MANNING'S N     0.01300

 NORMAL DEPTH(FT) =      1.60           CRITICAL DEPTH(FT) =      1.88
 ========================================  ================================
 UPSTREAM CONTROL ASSUMED FLOWDEPTH(FT) =     1.88

 GRADUALLY VARIED FLOW PROFILE COMPUTED INFORMATION:

 DISTANCE FROM      FLOW DEPTH  VELOCITY      SPECIFIC         PRESSURE+
  CONTROL(FT)          (FT)    (FT/SEC)     ENERGY(E"'T)    MOMENTUM(E'OUNDS)
        0.000          1.876      7.690          2.795           660.29
        0.060          1.865      7.737          2.795           660.34
        0.205          1.854      7.784          2.796           660.45
```

```
          0.441          1.843          7.832          2.797          660.63
          0.778          1.832          7.882          2.798          660.88
          1.224          1.822          7.931          2.799          661.20
          1.792          1.811          7.982          2.801          661.59
          2.493          1.800          8.034          2.802          662.04
          3.344          1.789          8.087          2.805          662.57
          4.363          1.778          8.140          2.807          663.17
          5.570          1.767          8.195          2.810          663.85
          6.993          1.756          8.250          2.813          664.59
          8.662          1.745          8.307          2.817          665.42
         10.619          1.734          8.364          2.821          666.32
         12.912          1.723          8.423          2.825          667.30
         15.605          1.712          8.483          2.830          668.36
         18.785          1.701          8.543          2.835          669.50
         22.565          1.690          8.605          2.841          670.73
         27.107          1.679          8.668          2.847          672.03
         32.647          1.668          8.732          2.853          673.43
         39.549          1.657          8.798          2.860          674.91
         48.428          1.646          8.864          2.867          676.47
         60.431          1.635          8.932          2.875          678.13
         78.141          1.625          9.001          2.883          679.88
        109.842          1.614          9.071          2.892          681.72
        293.270          1.612          9.078          2.893          681.92
------------------------------------------------------------------------------
  NODE   3024.00 : HGL = <  521.346>;EGL= <  522.265>;FLOWLINE= <  519.470>

********************** ****** ************************************ ********* ***
  FLOW PROCESS FROM NODE  3024.00 TO NODE  3024.00 IS CODE =  5
  UPSTREAM NODE  3024.00     ELEVATION =   519.80  (FLOW UNSEALS IN REACH)

  CALCULATE JUNCTION LOSSES:
       PIPE        FLOW    DIAMETER    ANGLE     FLOWLINE   CRITICAL   VELOCITY
                   (CFS)   (INCHES)  (DEGREES) ELEVATION  DEPTH(FT.)  (FT/SEC)
     UPSTREAM      30.40     30.00      90.00     519.80       1.88        6.193
    DOWNSTREAM     30.40     30.00                519.47       1.88        7.681
    LATERAL #1      0.00      0.00       0.00       0.00       0.00        0.000
    LATERAL #2      0.00      0.00       0.00       0.00       0.00        0.000
       QS           0.00===Q5 EQUALS BASIN INPUT===

  LACFCD AND OCEMA FLOW JUNCTION FORMULAE USED:
  DY=(Q2*V2-Ql*Vl*COS(DELTA1)-Q3*V3*COS(DELTA3)-
      Q4*V4*COS(DELTA4))/((Al+A2)*16.l)+FRICTION LOSSES
  UPSTREAM:     MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00549
  DOWNSTREAM:   MANNING'S N = 0.01300;  FRICTION SLOPE = 0.00657
  AVERAGED FRICTION SLOPE IN JUNCTION ASSUMED AS 0.00603
  JUNCTION LENGTH      4.00 FEET
  FRICTION LOSSES     0.024 FEET         ENTRANCE LOSSES     0.000 FEET
  JUNCTION LOSSES    (DY+HV1-HV2)+(ENTRANCE LOSSES)
  JUNCTION LOSSES    ( 1.339)+(  0.000) =    1.339

  NODE   3024.00 : HGL = <  523.009>;EGL= <  523.604>;FLOWLINE= <  519.800>

************************************************************* ***************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3024.00            FLOWLINE ELEVATION =    519.80
  ASSUMED UPSTREAM CONTROL HGL =    521.68 FOR DOWNSTREAM RUN ANALYSIS

================================     ================================
  END OF GRADUALLY VARIED FLOW ANALYSIS
```

100yr 3028-3027

PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
(Reference: LACFCD, LACRD, AND OCEMA HYDRAULICS CRITERION)
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Ver. 8.0 Release Date: 01/01/2003 License ID 1261

Analysis prepared by:

RICK ENGINEERING COMPANY
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San Diego, California 92110
619-291-0707 Fax 619-291-4165

DESCRIPTION OF STUDY

* McMILLIN OTAY RANCH VILLAGE 7 J-14531A *
* PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000 {NODE 3027 TO 3028 LATERAL} *
* 100-YR STORM EVENT, ULTIMATE CONDIITON BY:PT *

FILE NAME: 3000K.PIP
TIME/DATE OF STUDY: 15:35 11/15/2004

GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
NODAL POINT STATUS TABLE
{Note: "*" indicates nodal point data used.)

NODE NUMBER	MODEL PROCESS	UPSTREAM RUN PRESSURE HEAD{FT)	PRESSURE+ MOMENTUM(POUNDS)	DOWNSTREAM FLOW DEPTH(FT)	RUN PRESSURE+ MOMENTUM(POUNDS}
3027.00-	} FRICTION	2.32*	239.26	0.79	142.36
3028.00-	) CATCH BASIN	1.65*	164.40	1.08 De	125.99
3028.00-		2.00*	138.12	1.08 De	40.S6

MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE = 25

NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST CONSERVATIVE FORMULAE FROM THE CURRENT LACRD, LACFCD, AND OCEMA DESIGN MANUALS.

DOWNSTREAM PIPE FLOW CONTROL DATA:
NODE NUMBER = 3027.00 FLOWLINE ELEVATION = 499.10
PIPE FLOW = 7.74 CFS PIPE DIAMETER = 18.00 INCHES
ASSUMED DOWNSTREAM CONTROL HGL = 501.424 FEET

NODE 3027.00 : HGL = < 501.424>;EGL= < 501.722>;FLOWLINE= < 499.100>

FLOW PROCESS FROM NODE 3027.00 TO NODE 3028.00 IS CODE = 1
UPSTREAM NODE 3028.00 ELEVATION = 500.03 (FLOW IS UNDER PRESSURE)

CALCULATE FRICTION LOSSES(LACFCD} :
PIPE FLOW 7.74 CFS PIPE DIAMETER = 18.00 INCHES
PIPE LENGTH 46.25 FEET MANNING'S N 0.01300
SF=(Q/K)**2 {(7.74)/(105.045))**2 = 0.00543
HF=L*SF = (46.25)*(0.00543) = 0.251

NODE 3028.00 : HGL = < 501.675>;EGL= < 501.973>;FLOWLINE= < 500.030>

```
********************* ************************  ******************************
 FLOW PROCESS FROM NODE  3028.00 TO NODE  3028.00 IS CODE =  8
 UPSTREAM NODE  3028.00     ELEVATION =   500.03  (FLOW IS UNDER PRESSURE)

 CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD):
 PIPE FLOW =      7.74 CFS          PIPE DIAMETER =  18.00 INCHES
 FLOW VELOCITY =  4.38 FEET/SEC.  VELOCITY HEAD =  0.298 FEET
 CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.298) =  0.060

 NODE  3028.00 : HGL = <  502.033>;EGL= <  502.033>;FLOWLINE= <  500.030>

 ****************************************************************************
 UPSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  3028.00           FLOWLINE ELEVATION =  500.03
 ASSUMED UPSTREAM CONTROL HGL =    501.11 FOR DOWNSTREAM RUN ANALYSIS


 END OF GRADUALLY VARIED FLOW ANALYSIS
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100 yr 3033 - 3027

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**************************** ************************************** *** * ***** ***
                PIPE-FLOW HYDRAULICS COMPUTER PROGRAM PACKAGE
            (Reference: LACFCD,LACRD, AND OCEMA HYDRAULICS CRITERION)
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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
  * McMILLIN OTAY RANCH VILLAGE 7                                    J-14531A *
  * PRESSURE PIPE FLOW ANALYSIS AT BASIN 3000 (NODE 3027 TO 3033 LATERAL)  *
  * 100-YR STORM EVENT, ULTIMATE CONDITION                            BY:PT  *
 ************************************  ***************** ********** *********

  FILE NAME: 3000J.PIP
  TIME/DATE OF STUDY: 15:40 11/15/2004

************************************************    ********** ****** *********
               GRADUALLY VARIED FLOW ANALYSIS FOR PIPE SYSTEM
                        NODAL POINT STATUS TABLE
                 (Note: "*" indicates nodal point data used.)
                        UPSTREAM RUN                    DOWNSTREAM RUN
   NODE     MODEL    PRESSURE       PRESSURE+          FLOW          PRESSURE+
 NUMBER   PROCESS   HEAD(FT)    MOMENTUM(POUNDS)    DEPTH(FT)    MOMENTUM(POUNDS)
 3027.00-              2.32*            235.74         0.74              144.03
        } FRICTION
 3033.00-              1.92*            190.74         1.06 De           121.38
        } CATCH BASIN
 3033.00-              2.25*            165.87         1.06 De            39.32

 MAXIMUM NUMBER OF ENERGY BALANCES USED IN EACH PROFILE =  25

 NOTE: STEADY FLOW HYDRAULIC HEAD-LOSS COMPUTATIONS BASED ON THE MOST
 CONSERVATIVE FORMULAE FROM THE CURRENT LACRD,LACFCD, AND OCEMA
 DESIGN MANUALS.
************************************************************    *************
 DOWNSTREAM PIPE FLOW CONTROL DATA:
 NODE NUMBER =  3027.00            FLOWLINE ELEVATION =    499.10
 PIPE FLOW =       7.53 CFS        PIPE DIAMETER =  18.00 INCHES
 ASSUMED DOWNSTREAM CONTROL HGL =   501.424 FEET

 NODE  3027.00 : HGL = <  501.424>;EGL= <  501.706>;FLOWLINE= <  499.100>

***************** ************ ********** ****** ********** *** ************** *
 FLOW PROCESS FROM NODE  3027.00 TO NODE  3033.00 IS CODE =  1
 UPSTREAM NODE  3033.00     ELEVATION =   499.53   (FLOW IS UNDER PRESSURE)

 CALCULATE FRICTION LOSSES(LACFCD):
 PIPE FLOW           7.53 CFS     PIPE DIAMETER =  18.00 INCHES
 PIPE  LENGTH        4.25 FEET          MANNING'S N      0.01300
 SF=(Q/K)**2    ((      7.53)/(   105.090))**2 =
 HF=L*SF = (      0.00513 4.25)*(0.00513) =      0.022

 NODE  3033.00 : HGL = <  501.446>;EGL= <  501.728>;FLOWLINE= <  499.530>
```

```
****************************************************************************
  FLOW PROCESS FROM NODE  3033.00 TO NODE  3033.00 IS CODE =  8
  UPSTREAM NODE  3033.00     ELEVATION =   499.53  (FLOW IS UNDER PRESSURE)

  CALCULATE CATCH BASIN ENTRANCE LOSSES(LACFCD) :
  PIPE FLOW =       7.53 CFS          PIPE DIAMETER =  18.00 INCHES
  FLOW VELOCITY =  4.26 FEET/SEC.  VELOCITY HEAD =  0.282 FEET
  CATCH BASIN ENERGY LOSS = .2*(VELOCITY HEAD) = .2*(  0.282) =  0.056

  NODE  3033.00 : HGL = <  501.784>;EGL= <  50l.784>;FLOWLINE= <  499.530>

********** ***************** ********************************  ******************
  UPSTREAM PIPE FLOW CONTROL DATA:
  NODE NUMBER =  3033.00           FLOWLINE ELEVATION =   499.53
  ASSUMED UPSTREAM CONTROL HGL =    500.59 FOR DOWNSTREAM RUN ANALYSIS


  END OF GRADUALLY VARIED FLOW ANALYSIS
```

APPENDIX G

Inlet and Brow Ditch Sizing Calculations

Inlet Sizing Calculations

Village 7 Vista Verde
Inlet Summary Table

Node Number	Street Name	Station	Inlet Type	Flow (cfs)*	Approach Slope ft/ft)	Length of Opening (ft)	Length of Inlet (ft)
1002	Schircliffe Street						17
1009	Schirciiffe Street	13+35.26	B			8	9
1017	Schircliffe Street				Sum	4	5
1030	Wolfsdorf Wa	6+20.84	B1	11.1		7	8
1039	WolfsdorfWa	7+51.20	61	7.1		5	6
1 7			B			4	5
1053						4	5
1062		10+83.66	B		Sum	4	5
1068	Ma dalena Avenue					4	S

• cubic feet per second
•• see summary of Type F Inlets
Note: All Type F inlets *and* Inlets located at sumps are designed for the 1DO-year peak flow rate.
Inlets on grade are designed for the 50-year peak flow rate

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**********************************  ********************  ****************
                    CAPACITY OF TYPE B INLETS ON A GRADE
                  COPYRIGHT 1992 RICK ENGINEERING COMPANY
     ************************************  * ********************  ******  '  ******
     INLET AT 1002



     DISCHARGE =  6.1  CFS
     STREET CROSS SLOPE =  .02  FT/FT
     STREET SLOPE    .0199  FT/FT
     COMPUTED DEPTH OF FLOW AT THE CURB     .36  FT
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING THE FOLLOWING EQUATION Q=0.7L(A+Y) 3/2     15.3  FT
     LENGTH OF INLET OPENING =  16  FT
     LENGTH OF INLET TO BE USED =  17  FT
     ******   ************************************************************
                    CAPACITY OF TYPE B INLETS IN A SUMP
                  COPYRIGHT 1992 RICK ENGINEERING COMPANY
     ************************************   ************************************
     INLET AT 1006



     DISCHARGE =  4.7  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART 1-103.6C (Q/L=l.7) =  2.8  FT
     LENGTH OF INLET OPENING USED    4  FT
     LENGTH OF INLET TO BE USED =  5  FT

     ************* ***** ************** * ************************************
                    CAPACITY OF TYPE B INLETS IN A SUMP
                  COPYRIGHT 1992 RICK ENGINEERING COMPANY
     ***************** ****************************** ********* *** ************** **
     INLET AT 1009



     DISCHARGE =  12.9  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART 1-103. 6C (Q/L=l.7) = 7. 6  FT
     LENGTH  OF  INLET  OPENING  USED  8  FT
     LENGTH OF INLET TO BE USED =  9  FT
```

CAPACITY OF TYPE B INLETS IN A SUMP
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INLET AT 1015

DISCHARGE = .9 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) .5 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

CAPACITY OF TYPE B INLETS IN A SUMP
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INLET AT 1017

DISCHARGE = 5.2 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C {Q/L=l.7) = 3.1 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

CAPACITY OF TYPE B INLETS IN A SUMP
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INLET AT 1027

DISCHARGE = 7.3 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART 1-103.6C (Q/L=l .7) 4.3 FT
LENGTH OF INLET OPENING USED 5 FT
LENGTH OF INLET TO BE USED = 6 FT

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

CAPACITY OF TYPE B INLETS IN A SUMP

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

INLET AT 1030

DISCHARGE = 11.l CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7} = 6.5 FT
LENGTH OF INLET OPENING USED 7 FT
LENGTH OF INLET TO BE USED = 8 FT

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

CAPACITY OF TYPE B INLETS IN A SUMP

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

INLET AT 1036

DISCHARGE = 2 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) = 1.2 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

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

CAPACITY OF TYPE B INLETS IN A SUMP

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

INLET AT 1039

DISCHARGE = 7.1 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7} = 4.2 FT
LENGTH OF INLET OPENING USED 5FT
LENGTH OF INLET TO BE USED = 6 FT

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**************************************************    *****************
                  CAPACITY OF TYPE B INLETS IN A SUMP
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     ***************************************************    *****************
     INLET AT 1044



     DISCHARGE =  6  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART 1-103.6C (Q/L=l.7)    3.5  FT
     LENGTH OF INLET OPENING USED    4  FT
     LENGTH OF INLET TO BE USED =  5  FT

     ************************************************************************
                  CAPACITY OF TYPE B INLETS IN A SUMP
                COPYRIGHT 1992 RICK ENGINEERING COMPANY
     ************   ********************************************************
     INLET AT 1047



     DISCHARGE    5.2  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART 1-103.6C (Q/L=l.7) =  3.1  FT
     LENGTH OF INLET OPENING USED    4  FT
     LENGTH OF INLET TO BE USED =  5  FT

     ************************************************************************
                  CAPACITY OF TYPE B INLETS IN A SUMP
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     ************************************************************************
     INLET AT 1051



     DISCHARGE =  .51  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART l-103.6C (Q/L=l.7)    .3  FT
     LENGTH OF INLET OPENING USED    4  FT
     LENGTH OF INLET TO BE USED =  5  FT
```

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************************************************************    ************
                    CAPACITY OF TYPE B INLETS IN A SUMP
                  COPYRIGHT 1992 RICK ENGINEERING COMPANY
    ************************************************************************
    INLET AT 1053



    DISCHARGE =  1.8  CFS
    LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
    USING CHART l-103.6C (Q/L=l.7) =  1.1  FT
    LENGTH OF INLET OPENING USED    4  FT
    LENGTH OF INLET TO BE USED =  5 FT

     ************************************************************************
                    CAPACITY OF TYPE B INLETS IN A SUMP
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    ************************************************************************    *
    INLET AT 1056



    DISCHARGE =  .8  CFS
    LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
    USING CHART l-103.6C (Q/L=l.7)    .5  FT
    LENGTH OF INLET OPENING USED    4 FT
    LENGTH OF INLET TO BE USED =  5 FT

    ************** ************************************************************
                    CAPACITY OF TYPE B INLETS IN A SUMP
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    ************************************************************************
    INNLET AT 1062



    DISCHARGE =  3.4  CFS
    LENGTH OF INLET RSQUIRED TO INTERCEPT 100% OF FLOW
    USING CHART l-103.6C (Q/L=l.7)    2  FT
    LENGTH OF INLET OPENING USED    4  FT
    LENGTH OF INLET TO BE USED =  5  FT
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**********************************************************************
                    CAPACITY OF TYPE B INLETS IN A SUMP
                  COPYRIGHT 1992 RICK ENGINEERING COMPANY
     ****************************************************************  *******
     INLET AT 1065


     DISCHARGE =  3.9  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART l-103.6C (Q/L=l.7) = 2.3  FT
     LENGTH OF INLET OPENING USED  4  FT
     LENGTH OF INLET TO BE USED =  5  FT

     ************************************************************************    **
                    CAPACITY OF TYPE 8 INLETS IN A SUMP
                  COPYRIGHT 1992 RICK ENGINEERING COMPANY
     ***  *******  ***************************************************************
     INLET AT 1068


     DISCHARGE =  3  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART l-103.6C (Q/L=l.7)    1.8  FT
     LENGTH OF INLET OPENING USED    4  FT
     LENGTH OF INLET TO BE USED =  5  FT

     ************************************************  ***** ****   *** k ***.k ***
                    CAPACITY OF TYPE B INLETS IN A SUMP
                  COPYRIGHT 1992 RICK ENGINEERING COMPANY
     *****************  ************** * ************ ****************************
     INLET AT 1071


     DISCHARGE =  6.5  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART l-103.6C (Q/L=l.7) =  3.8  FT
     LENGTH OF INLET OPENING USED    4  FT
     LENGTH OF INLET TO BE USED =  5  FT
```

Village 7 Vista Verde
Inlet Summary Table

Node Number	Street Name	Station	Inlet Type	Flow (cfs)*	Approach Slope (ft/ft)	Length of Opening (ft)	Length of Inlet (ft)
2005	Brezar Street	24+95.14	81	2.3	0.01	7	8
2009	Brezar Street	[illegible]	B1	9.6	0.01	10	11
2012	Brezar Street	28+00.67	B1	2.2	0.01	7	8
2016	Brezar Street	19+48.90	B1	2.1	0.04	8	9
2020	Brezar Street	33+83.12	B	5.8	Sump	4	5
2025	Brezar Street	33+83.12	B1	5.1	Sump	4	[illegible]
2034	Brezar Street		B1	8.7	Sump	6	7
2037	Brezar Street		B1	7.7	Sump	5	6
2100	Brezar Street		B1	3.7	0.053	12	13
2102	Brezar Street		F	3.2	**	**	**
		10+70.00					
		13+78.14					

• cubic feet per second
.... see summary of Type F Inlets
Note: All Type F inlets and Inlets located at sumps are designed for the 100-yearpeak flow rate.
Inlets on grade are designed for the 50-year peak flow rate

Basin2000

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********** ********** ***** ***** *** ********** ******
                  CAPACITY OF TYPE B INLETS ON A GRADE
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***** ********** ********* **********
INLET AT 2005


DISCHARGE =  2.3  CFS
STREET CROSS SLOPE =  .02   FT/FT
STREET SLOPE     .01  FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB     .29  FT
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING THE FOLLOWING EQUATION Q=0.7L(A+Y)A3/2     6.7  FT
LENGTH OF INLET OPENING =  7  FT
LENGTH OF INLET TO BE USED =  8  FT
**********
                  CAPACITY OF TYPE B INLETS ON A GRADE
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**********  ********** ******** ***
INLET AT 2009


DISCHARGE =  3.6  CFS
STREET CROSS SLOPE =  .02   FT/FT
STREET SLOPE     .01  FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB     .34  FT
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING THE FOLLOWING EQUATION Q=0.7L(A+Y)A3/2     9.4  FT
LENGTH OF INLET OPENING =  10  FT
LENGTH OF INLET TO BE USED =  11  FT
**********  **********
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INLET AT 2012


DISCHARGE =  2.2  CFS
STREET CROSS SLOPE =  .02  FT/FT
STREET SLOPE     .01  FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB     .29  FT
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING THE FOLLOWING EQUATION Q=0.7L(A+Y)A3/2     6.4  FT
LENGTH OF INLET OPENING =  7  FT
LENGTH OF INLET TO BE USED =  8  FT
```

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INLET AT 2016



DISCHARGE =  2.1  CFS
STREET CROSS SLOPE =  .02  FT/FT
STREET SLOPE     .04  FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB  .23  FT
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING THE FOLLOWING EQUATION Q=0.7L(A+Y)A 3/2    7.1  FT
LENGTH OF INLET OPENING =  8  FT
LENGTH OF INLET TO BE USED =  9  FT
************************************************************    **********
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********************  *********  ************************************  *****
INLET AT 2020



DISCHARGE =  5.8  CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C  (Q/L=l.7) =  3.4  FT
LENGTH OF INLET OPENING USED  4  FT
LENGTH OF INLET TO BE USED =  5  FT

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INLET AT 2025



DISCHARGE =  5.1  CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) =  3  FT
LENGTH OF INLET OPENING USED    4  FT
L8NGTH OF INLET TO BE USED =  5 FT
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     INLET AT 2034



     DISCHARGE =  8.7  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART l-103.6C (Q/L=l.7) =  5.1  FT
     LENGTH OF INLET OPENING USED 6  FT
     LENGTH OF INLET TO BE USED =  7  FT

     ************************************************************* *********
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     INLET AT 2037



     DISCHARGE =  7.7  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART l-103.6C (Q/L=l.7) =  4.5  FT
     LENGTH OF INLET OPENING USED    5FT
     LENGTH OF INLET TO BE USED =  6  FT

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     INLET AT 2100



     DISCHARGE =  3.7  CFS
     STREET CROSS SLOPE =  .02  FT/FT
     STREET SLOPE    .053  FT/FT
     COMPUTED DEPTH OF FLOW AT THE CURB    .26  FT
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING THE FOLLOWING EQUATION Q=0.7L(A+Y)3/2    11.6  FT
     LENGTH OF INLET OPENING =  12  FT
     LENGTH OF INLET TO BE USED =  13  FT
```

Village 7 Vista Verde
Inlet Summary Table

Node Number	Street Name	Station	Inlet Type	Flow (cfs)*	Approach Slope (ft/ft)	Length of Opening (ft)	Length of Inlet (ft)
3002	Wolfsdorf Way	13+05.19	B	6.1	Sump	4	5
3004	Wolfsdorf Way	13+16.53	B	2.2	Sump		
3009	Wolfsdorf Way	11+76.70	B	2.5	Sump	4	5
3012	Wolfsdorf Way	11+84.04	B	3.0	Sump	4	5
3016	Wolf Canyon Loop	10+80.35	B	1.9	Sump	4	5
3019	Magdalena Avenue	10+65.27	F	0.7	**	**	**
3022	Wolf Canyon Loop	10+80.35	B	0.8	Sump	4	5
3028	Magdalena Avenue	28+24.00	B1	6.5	Sump	4	5
3033	Magdalena Avenue	28+24.00	B1	7.5	Sump	5	6

* cubic feet per second
** see summary of Type F Inlets
Note: All Type F inlets and Inlets located at sumps are designed for the 100-year peak flow rate.
Inlets on grade are designed for the 50-year peak flow rate

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 INLET AT 3002


 DISCHARGE =  6.1  CFS
 LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
 USING CHART l-103.6C  (Q/L=l.7) =  3.6  FT
 LENGTH OF INLET OPENING USED    4FT
 LENGTH OF INLET TO BE USED =  5  FT

 ************************************************************************
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 ******************************************  ***********************  ***
 INLET AT 3004


 DISCHARGE =  2.2  CFS
 LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
 USING CHART l-103.6C  (Q/L=l.7)    1.3  FT
 LENGTH OF INLET OPENING USED    4FT
 LENGTH OF INLET TO BE USED =  5  FT

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 INLET AT 3009


 DISCHARGE =  2.5  CFS
 LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
 USING CHART l-103.6C (Q/L=l.7) =  1.5  FT
 LENGTH OF INLET OPENING USED    4FT
 LENGTH OF INLET TO BE USED =  5  FT
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CAPACITY OF TYPE B INLETS IN A SUMP
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INLET AT 3012

DISCHARGE = 3 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) 1.8 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

CAPACITY OF TYPE B INLETS IN A SUMP
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INLAT AT 3016

DISCHARGE = 1.9 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART 1-103.6C (Q/L=l.7} = 1.1 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

CAPACITY OF TYPE B INLETS IN A SUMP
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INLET 3022

DISCHARGE = .8 CFS
LENGTH Of INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7} = .5 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

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INLET 3028


DISCHARGE =  6.5  CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) =  3.8  FT
LENGTH OF INLET OPENING USED    4  FT
LENGTH OF INLET TO BE USED =  5 FT

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INLET 3033


DISCHARGE =  7.5  CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) =  4.4  FT
LENGTH OF INLET OPENING USED    5  FT
LENGTH OF INLET TO BE USED =  6 FT
```

Village 7 Vista Verde
Inlet Summary Table

Node Number	Street Name	Station	Inlet Type	Flow (cfs)*	Approach Slope (ft/ft)	Length of Opening (ft)	Length of Inlet (ft)
11002	Koester Street	10+05.50	B	1.7	Sump	4	5
[illegible]	[illegible]	[illegible]	B	5	Sump	4	[illegible]

• cubic feet per second

Note: Alf Type F inlets and Inlets located at sumps are designed for the 100-year peak flow rate.
Inlets on grade are designed for the 50-year peak flow rate

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INLET AT 11002



DISCHARGE =  1.7  CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) =  1  FT
LENGTH OF INLET OPENING USED    4  FT
LENGTH OF INLET TO BE USED =  5  FT

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INLET AT 11004



DISCHARGE =  3.5  CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7)    2.1  FT
LENGTH OF INLET OPENING USED    4  FT
LENGTH OF INLET TO BE USED =  5  FT
```

Village 7 Vista Verde
Inlet Summary Table

Node Number	Street Name	Station	Inlet Type	Flow (cfs)*	Approach Slope (ft/ft)	Length of Opening (ft)	Length of Inlet (ft)
		13+40.00	81	7.4	Sump	5	6
f!		Y83					5
12051	Koester Street	16+69.00	B1	3.3	0.035	11	12
12054	Koester Street	16+69.00	B1	4.5	0.035	13	14
12063	Perrin Place	24+15.00	B1	10.5	Sump	7	8
12068	Perrin Place	24+79.11	B1	3.5	0.015	10	11
12081	Wolf Canyon Loop	25+30.00	B	0.5	Sump	4	5
12083	Wolf Canyon Loop	25+30.00	B	4.1	Sump	4	5
12091	Bob Pletcher Way	2+23.00	B	5.1	Sump	4	5
094	Bob Pletcher Way	2+23.00	B	6.3	Sump	4	5

• cubic feet per second

Note: All Type F inlets and Inlets located at sumps are designed for the 100-year peak flow *rate.*
Inlets on grade are designed for the 50-year peak flow rate

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     INLET AT 12043



     DISCHARGE =  7.4  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART l-103.6C (Q/L=l.7} =  4.4  FT
     LENGTH OF INLET OPENING USED    S  FT
     LENGTH OF INLET TO BE USED =  6  FT

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     INLET AT 12046



     DISCHARGE =  4.3  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART l-103.6C  (Q/L=l.7) =  2.5  FT
     LENGTH OF INLET OPENING USED    4  FT
     LENGTH OF INLET TO BE USED =  S  FT

     ***************************************  **********  **********************
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     INLET AT 12051



     DISCHARGE =  3.3  CFS
     STREET CROSS SLOPE =  .02  FT/FT
     STREET SLOPE    .035  FT/FT
     COMPUTED DEPTH OF FLOW AT THE CURB     .27  FT
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING THE FOLLOWING EQUATION Q=0.7L(A+Y) 3/2    10.1  FT
     LENGTH OF INLET OPENING =  11  FT
     LENGTH OF INLET TO BE USED =  12  FT
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     INLET AT 12054


     DISCHARGE =  4.5  CFS
     STREET CROSS SLOPE =  .02  FT/FT
     STREET SLOPE     .035  FT/FT
     COMPUTED DEPTH OF FLOW AT THE CURB     .3  FT
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING THE FOLLOWING EQUATION Q=0.7L(A+Y)A3/2     12.9  FT
     LENGTH OF INLET OPENING =  13  FT
     LENGTH OF INLET TO BE USED =  14  FT
     ************* ******************** ********************** ************ ***
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     INLET AT 12063


     DISCHARGE=  10.5  CFS
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING CHART .l-103.6C (Q/L=l.7) =  6.2  FT
     LENGTH OF INLET OPENING USED    7  FT
     LENGTH OF INLET TO BE USED =  8  FT

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     INLET AT 12068


     DISCHARGE =  3.5  CFS
     STREET CROSS SLOPE =  .02  FT/FT
     STREET SLOPE     .015  FT/FT
     COMPUTED DEPTH OF FLOW AT THE CURB     .31  FT
     LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
     USING THE FOLLOWING EQUATION Q=0.7L(A+Y)A3/2     9.7  FT
     LENGTH OF INLET OPENING =  10  FT
     LENGTH OF INLET TO BE USED =  11  FT
```

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INLET AT 12081

DISCHARGE = .5 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) = .3 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

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INLET AT 12083

DISCHARGE = 4.1 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) = 2.4 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

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INLET AT 12091

DISCHARGE = 5.1 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART 1-103.6C (Q/L=l.7) 3 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

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INLET AT 12094

DISCHARGE = 6.3 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART 1-103.6C (Q/L=l.7) 3.7 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

Village 7 Vista Verde
Inlet Summary Table

Node Number	Street Name	Station	Inlet Type	Flow (cfs)*	Approach Slope (ft/ft)	Length of Opening (ft)	Length of Inlet (ft)
13003	Peabody Way	10+73.00	B	3.5	Sump	4	5
13007	Peabody Way	[illegible]	B	4.5	Sump	4	5
13013	Magdalena Avenue	44+18.00	B	3.9	Sump	4	5
13016	Magdalena Avenue	44+18.00	F	....	....	....	....
13017	Magdalena Avenue	44+18.00	B	3.5	Sump	4	5

* cubic feet per second

.... see summary of Type F Inlets

Note: **All** Type F inlets and Inlets located at sumps are designed for the 100-year peak flow rate.
Inlets on grade are designed for the 50-year peak flow rate

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INLET AT 13003

DISCHARGE = 3.5 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) 2.1 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

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INLET AT 13007

DISCHARGE = 4.5 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) = 2.6 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

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INLET AT 13013

DISCHARGE = 3.9 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) 2.3 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

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INLET AT 13016

DISCHARGE = 2.3 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l .7) = 1.4 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

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INLET AT 13017

DISCHARGE = 3.5 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) 2.1 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USf.D = 5 FT

Village 7 Vista Verde
Inlet Summary Table

Node Number	Street Name	Station	Inlet Tvoe	Flow Ccfs)*	Approach Slope (ftlft)	Length of Opening (ft)	Length of Inlet (ft)
14004	Rock Mountain Road	39+00.00	81	1.3	0.017	5	6
i'.14017	ROCfC\M6'tintaifi Roac	3H7.133f4Q.oo	B1	3.8	0.032	12	13
14017	Rock Mountain Road	27+10.00	B1	4.9	0.032	11	15
14021	Magdalena Aiienue	54+97.00	Sump	6.5	Sump	4	5
14025	Maadalena Avenue	54+97.00	B	4.3	Sump	4	5

"cubic feet per second
** see summary of Type F Inlets
Note: All Type F inlets and Inlets located at sumps are designed for the 1DO-year peak flow rate.
Inlets on grade are designed for the 50-year peak flow rate

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Inlet at Node 14004


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

DISCHARGE =  1.27  CFS
STREET CROSS SLOPE    .02  FT/FT
STREET SLOPE =   .017  FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB =   .23  FT
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING THE FOLLOWING EQUATION Q=0.7L(A+Y)A 3/2 =  4.4  FT
LENGTH OF INLET OPENING =  5  FT
LENGTH OF INLET TO BE USED =  6  FT

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Inlet at Node 14012


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

DISCHARGE =  3.77  CFS
STREET CROSS SLOPE    .02  FT/FT
STREET SLOPE    .032  FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB    .29  FT
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING THE FOLLOWING EQUATION Q=0.7L(A+Y)A 3/2    11.1  FT
LENGTH OF INLET OPENING =  12  FT
LENGTH OF INLET TO BE USED =  13  FT

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Inlet at Node 14017


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DISCHARGE =  4.86  CFS
STREET CROSS SLOPE    .02  FT/FT
STREET SLOPE    .032  FT/FT
COMPUTED DEPTH OF FLOW AT THE CURB    .31  FT
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING THE FOLLOWING EQUATION Q=0.7L(A+Y)A 3/2    13.6  FT
LENGTH OF INLET OPENING =  14  FT
LENGTH OF INLET TO BE USED =  15  FT
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INLET AT 14021

DISCHARGE = 6.5 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L= l.7) = 3.8 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

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INLET AT 14025

DISCHARGE = 4.3 CFS
LENGTH OF INLET REQUIRED TO INTERCEPT 100% OF FLOW
USING CHART l-103.6C (Q/L=l.7) = 2.5 FT
LENGTH OF INLET OPENING USED 4 FT
LENGTH OF INLET TO BE USED = 5 FT

Village 7 Vista Verde
Type F Inlet Summary Table

Node Number	Street Name	Station	Flow (cfs*)
1056	Magdalena Avenue	15+51.49	0.8
1065	Magdalena Avenue	11+44.00	3.9
1071	Magdalena Avenue	11+44.00	6.5
2102	Brezar Street	33+47.38	3.2
3019	Magdalena Avenue	10+65.27	0.7
13016	Magdalena Avenue	44+18.00	2.3

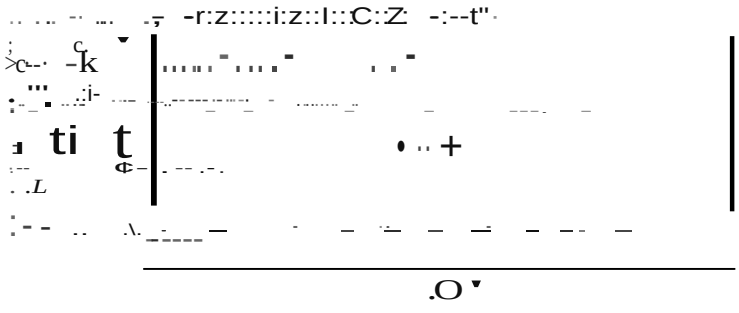
* cubic feet per second

Note: All Type F inlets and Inlets located at sumps are designed for the 100-year peak flow rate.

- R JNEERING . .
(CoMPANY
JF'riarsRo1d·S111Diego, CA 9211-0-2596 ·Pb011C:619-291..0707 ·www{iclcong.coro

TYPC: F CATC..H- f':JAIrJ
CA.fJ'A:t;11'--f CH-5G-

CAPACITY OF STANDARD BASIN :



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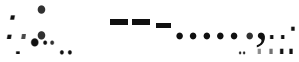
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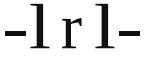
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'E" -< h--to i Q =- (1q) :::: \S'6c.f-s

Manhole frame and cover.



Slope floor 12:1
towards outlet



SECTION A-A

SECTION 8-B

4 -f 4
around opening \.



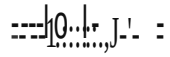
PLAN

NOTES

LEGEND ON PLANS

. Exposed edges of concrete shall be rounded with a radius of 1/2".

1. SH St1ndanl Drawing D·11for additienal notes and details.
2. When V exceed$4' steps shall be installed. See Standard Drawing D11 for details_
3
4. Openings on both sides unless otherwise shown on plans.
S. Maintain 1 1/2" clear spacing between reinforcing and surface.

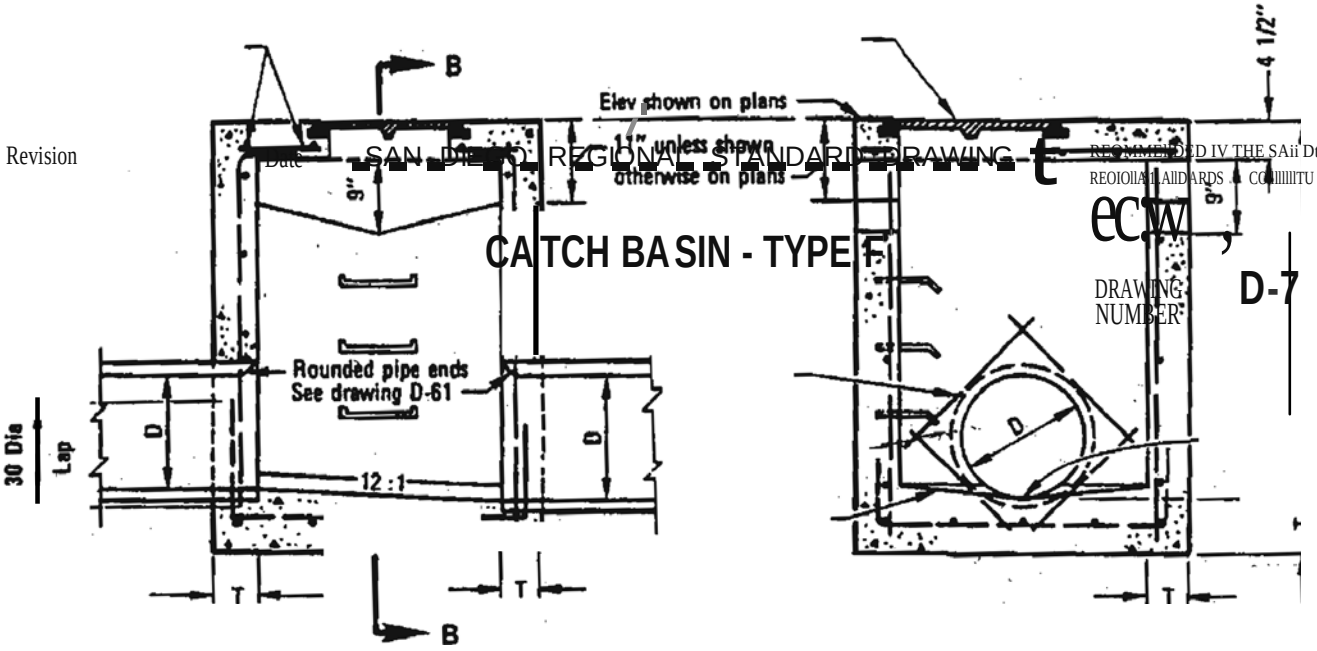


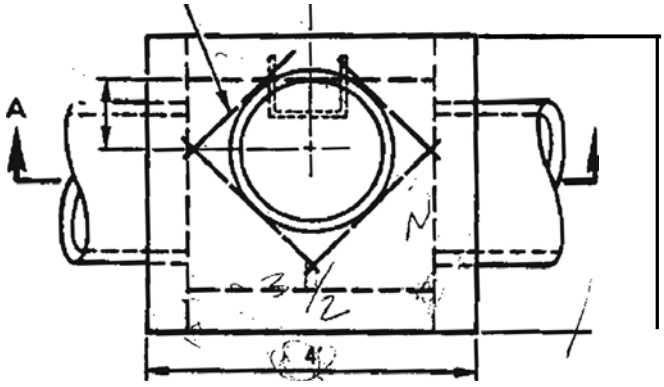
J · Revision Date SAN DIEGO REGIONAL STANDARD DRAWING RECOMMENDED IV THE SAii DtllO REOIOIIAIL AIIDARDS A COIIIIIIIITU

ecw If1S

CATCH BASIN - TYPE F

DRAWING NUMBER D-7





	By	Approved
Lao		5-86

Brow Ditch Sizing Calculations

McMillin Village 7 Vista Verde
Brow Ditch Summary Table

Brow Ditch	Type			
Basin 1000				
1056	075-B	0.3	0.008	0.2
1065	075-B	3.2	0.010	0.5
1071a	075-B	1.6	0.032	0.3
1071b	075-B	1.6	0.060	0.3
B*"	Modified 3-foot Wide 075-B	7.8	0.013	0.7
C*"	Modified 2.5-foot Wide 075-B	4.8	0.013	0.6
Basin 2000				
2102a	075-B	3.0	0.008	0.6
2102b	075-B	3.0	0 068	0.6
A**	075-B	3.2	0.012	0.5
Basin 3000				
3019	075-B	0.7	0.008	0.5
3042	075-B	2.5	0.008	0.2
O*"	075-B	4.6	0.154	0.3
E**	075-B	2.2	0.133	0.2

* Cubic feet per second
** Brow ditch located at the perimeter of the basin

NORMAL DEPTH FOR CIRCULAR PIPES
COPYRIGHT 1992 RICK ENGINEERING COMPANY
PJPE BD1056

0.LuCHARGE IS	0.34	CFS	SLOPE IS =	0.0080	FT/FT
DIAMETER IS =	2.00	FT	MANNING'S N	0.015	
NORMAL DEPTH IS =	0.19	FT	CAPACITY IS	17.54	CFS
VELOCITY IS =	2.19	FPS	FROUDE NUMBER rs =	1.06	
AREA rs =	0.16	SQ FT	VELOCITY HEAD rs =	0.07	FT
HYDRAULIC RADIUS	0.12	FT	CRITICAL DEPTH =	0.20	FT
WETTED PERIMETER =	1.26	FT	CRITICAL VELOCITY =	2.09	FPS
TOP WIDTH rs =	1.18	FT			

NORMAL DEPTH FOR CIRCULAR PIPES
COPYRIGHT 1992 RICK ENGINEERING COMPANY
PIPE 8D1065

D.1....,CHARGE IS =	3.15	CFS	SLOPE IS =	0.0100	FT/FT
DIAMETER IS =	2.00	FT	MANNING'S N	0.015	
NORMAL DEPTH IS	0.54	FT	CAPACITY IS =	19.61	CFS
VELOCITY IS ==	4.58	FPS	FROUDE NUMBER IS	1.30	
AREA IS =	0.69	SQ FT	VELOCITY HEAD IS	0.33	FT
HYDRAULIC RADIUS	0.31	FT	CRITICAL DEPTH =	0.62	FT
WETTED PERIMETER	2.19	FT	CRITICAL VELOCITY =	3.80	FPS
TOP WIDTH IS =	1.78	FT			

NORMAL DEPTH FOR CIRCULAR PIPES

COPYRIGHT 1992 RICK ENGINEERING COMPANY

pToE BD107la

D.:;CHARGE IS =	1.55	CFS	SLOPE IS =	0.0320	FT/FT
DIAMETER IS =	2.00	FT	MANNING'S N =	0.015	
NORMAL DEPTH IS	0.29	FT	CAPACITY IS =	35.07	CFS
VELOCITY IS =	5.61	FPS	FROUDE NUMBER IS	2.23	
AREA IS =	0.28	SQ FT	VELOCITY HEAD IS =	0.49	FT
HYDRAULIC RADIUS	0.18	FT	CRITICAL DEPTH =	0.43	FT
WETTED PERIMETER =	1.55	FT	CRITICAL VELOCITY =	3.12	FPS
TOP WIDTH IS =	1.40	FT			

NORMAL DEPTH FOR CIRCULAR PIPES

COPYRIGHT 1992 RICK ENGINEERING COMPANY

PJPE BD107lb

D.L uCHARGE IS	1.55	CFS	SLOPE IS =	0.0600	FT/FT
DIAMETER IS =	2.00	FT	MANNING'S N	0.015	
NORMAL DEPTH rs	0.25	FT	CAPACITY IS	48.02	CFS
VELOCITY rs =	6.99	FPS	FROUDE NUMBER IS	3.00	
AREA IS =	0.22	SQ FT	VELOCITY HEAD IS	0.76	FT
HYDRAULIC RADIUS	0.15	FT	CRITICAL DEPTH =	0.43	FT
WETTED PERIMETER =	1.43	FT	CRITICAL VELOCITY =	3.12	FPS
TOP WIDTH IS =	1.31	FT			

NORMAL DEPTH FOR CIRCULAR PIPES
COPYRIGHT 1992 RICK ENGINEERING COMPANY
PJDE BD2102a

Dl.oCHARGE IS	3.01	CFS	SLOPE IS =	0.0080	FT/FT
DIAMETER IS =	2.00	FT	MANNING'S N	0.015	
NORMAL DEPTH IS	0.56	FT	CAPACITY IS =	17.54	CFS
VELOCITY IS =	4.17	FPS	FROUDE NUMBER IS =	1.16	
AREA IS =	0.72	SQ FT	VELOCITY HEAD IS	0.27	FT
HYDRAULIC RADIUS	0.32	FT	CRITICAL DEPTH =	0.61	FT
WETTED PERIMETER	2.23	FT	CRITICAL VELOCITY =	3.75	FPS
TOP WIDTH IS =	1.80	FT			

NORMAL DEPTH FOR CIRCULAR PIPES
COPYRIGHT 1992 RICK ENGINEERING COMPANY
PJPE BD2102b

D.i.uCHARGE IS =	3.01	CFS	SLOPE IS =	0.0080	FT/FT
DIAMETER IS =	2.00	FT	MANNING'S N =	0.015	
NORMAL DEPTH IS	0.56	FT	CAPACITY IS =	17.54	CFS
VELOCITY IS =	4.17	FPS	FROUDE NUMBER IS =	1.16	
AREA IS =	0.72	SQ FT	VELOCITY HEAD IS =	0.27	FT
HYDRAULIC RADIUS	0.32	FT	CRITICAL DEPTH =	0.61	FT
WETTED PERIMETER	2.23	FT	CRITICAL VELOCITY =	3.75	FPS
TOP WIDTH IS =	1.80	FT			

NORMAL DEPTH FOR CIRCULAR PIPES
COPYRIGHT 1992 RICK ENGINEERING COMPANY
PTDE BD3042

D1.:iCHARGE IS =	2.52	CFS	SLOPE IS =	0.0080	FT/FT
DIAMETER IS =	2.00	FT	MANNING'S N =	0.015	
NORMAL DEPTH IS	0.51	FT	CAPACITY IS	17.54	CFS
VELOCITY IS =	3.97	FPS	FROUDE NUMBER IS	1.16	
AREA IS =	0.64	SQ FT	VELOCITY HEAD IS =	0.24	FT
HYDRAULIC RADIUS	0.30	FT	CRITICAL DEPTH =	0.55	FT
WETTED PERIMETER	2.12	FT	CRITICAL VELOCITY =	3.57	FPS
TOP WIDTH IS =	1.7 5	FT			

NORMAL DEPTH FOR CIRCULAR PIPES

COPYRIGHT 1992 RICK ENGINEERING COMPANY

PJPE BD3019

D.!.uCHARGE IS	0.65	CFS	SLOPE IS =	0.0080	FT/FT
DIAMETER IS =	2.00	FT	MANNING'S N =	0.015	
NORMAL DEPTH IS =	0.26	FT	CAPACITY IS =	17.54	CFS
VELOCITY IS =	2.66	FPS	FROUDE NUMBER IS =	1.10	
AREA IS =	0.24	SQ FT	VELOCITY HEAD IS =	0.11	FT
HYDRAULIC RADIUS	0.16	FT	CRITICAL DEPTH =	0.28	FT
WETTED PERIMETER	1.48	FT	CRITICAL VELOCITY =	2.48	FPS
TOP WIDTH IS =	1.35	FT			

APPENDIX H

Water Quality and Detention Basin Results

Water Quality Results

INEERING
COMPANY
5620 Friars Road • San Diego. California 92110·2595 • (619) 291-3588 • www.rickengineering.com

14531
OTAY Ranch VIH 7

Water Quality Volume Calculation

$Vol = (Trib.\ Area)\ (0.6\ inch)\ (C)$ Ac·ft

– r.:i-.i""'

:' "2--1„·2.. P-c..

C,..:.o, '3'Z.

$$V = 11_{„}.'Z.\ A\text{-}0\ (_0\cdot'-\cdot\ )\ (o.\ i.2)$$

$V = 9.0$ Ac. ft

– Basin 11000

$A = 3.3$ Ac

$C = 0.76$

$$V = l''1\cdot\text{-}At.)\ lo.i..\ \cdot\text{-}c....;)\ (0.1.)$$

$V = 0.126$ Ac. ft

$V_T = 9.0$ Ac ft + 0.126 Ac. ft

$V_T = 9.13$ Ac. ft

Detention Basin Resu]ts

2-year

****

FLOOD HYDROGRAPH PACKAGE (HEC-1)

JUN 19.98

VERSION 4.1

RUN DATE 2BSEP04 TIME 11:14:16

****

****

U.S. ARMY CORPS OF ENGINEERS

HYDROLOGIC ENGINEERING CENTER

609 SECOND STREET

* DAVIS. CALIFORNIA 95616

(916) 756-1104

****



THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73). HECIGS, 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 20 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY.
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....B.....9.....1O

FREE ***
          *DIAGRAM
    1     ID   OTAY RANCH VILLAGE 7  J-14531
    2     ID   2-YEAR DETENTION ANALYSIS
    3     rO   9-23-04  FILENAME: 2Y_DB.HC1
    4     IT       2 01JAN90    1200     200
    5     IO       5       0

    6     KKdetbasin
    7     KM   RUN DATE   9/23/2004
    8     KM   RATIONAL METHOD HYDROGRAPH PROGRAM
    9     KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
   10     KM   6HR RAINFALL IS  1.17  INCHES
   11     ICM  RATIONAL METHOD RUNOFF COEFFICIENT IS  0.827
   12     KM   RATIONAL METHOD TIME OF CONCENTRATION IS  20  MIN.
   13     KM   FOR THIS DATA TO RUN PROPERLY THlS IT CARD MUST BE ADDED TO YOUR HEC-1
   14     BA  0.3515
   15     IN      20 01JAN90    1150
   16     QI       0    13.l    13.7    14.8    15.5    17.2    18.3    20.9    22.1    27.
   17     Ql    31.6    46.4       6  293.95    37.2    24.9    19.5    16.3    14.2       0
   18     QI       0       0       0       0       0       0       0       0       0       0

   19     KK   DET_l
   20     KM   WATER QUALITY VOL 2.34 AC-FT AT ELEVATION 521.0.  THE MAXIMUM
   21     KM   DISCHARGE TO DRAIN THE WQ VOL IN 48 HRS IS 0.85 CFS WITH A 4" DIAM ORil'lCE.
          * KO 0,0,0,0,21
   22     RS       l    STOR      -1
   23     SV       0    .158    .755   1.517   2.342   3.229   4.181   5.201
   24     SE     517     518     519     520     521     522     523     524
   25     SQ       0    0.85   13.11   37.42   69.34  107.68  151.77  201.19  255.66  314.96
   26     SQ  378.92  447.43  520.39  597.72
   27     SE     517     521  521.25   521.5  521.75     522  522.25   522.5  522.75   523.0
   28     SE  523.25   523.5  523.75     524

   29     KK   DET_2
   30     KM   WATER QUALITY VOL 6.8 AC-FT AT ELEVATION 514.5.  THE MAXIMUM
   31     KM   DISCHARGE TO DRArN THE WQ VOL IN 48 HRS IS 3.27 CFS WITH A 6" DIAM ORIFICE.
   32     KM   THE Qwq INCLUDES THE a.as CFS FROM DET_l.
          • KO 0,0,0,0,21
   33     RS            STOR      -1
   34     SV       0    .034    .309    .761   1.335   1.947   2.596    3.28    3.99   4.755
   35     SV   6.377   7.245   8.151   9.097  10.084  11.116  12.193
   36     SE   503.5     504     505     506     507     506     509     510     511     512
   37     SE     514     515     516     517     518     519     520
   38     SQ       0    3.27    6.29   18.12   33.88   53.08  100.89  160.52  231.61  314.01
   39     SQ  405.20  433.17  459.45
   40     SE   503.5   514.5  514.75     515  515.25   515.5     516   516.5     517   51?.5
   41     SE     518   518.5     519

   42     KKrecwater
   43     KM   RUN DATE   9/23/2004
   44     KM   RATIONAL METHOD HYDROGRAPH PROGRAM
   45     KM   COPYRIGHT 1992, 2ao1, RICK ENGINEERING COMPANY
   46     KM   6HR RAINFALL IS 1.17 CNCHES
   47     KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  0.72
```

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

  48      KM   RATIONAL METHOD TIME OF CONCENTRATION IS  21  MIN.
  49      KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOURc HEC-1
  50      BA  0.0322
  51      IN      21 01JAN90    1159
  52      QI       0     1.1     1.1     1.2     1.3     1.4     1.6     1.B     2.1     2.4
  53      QI     3.6     0.1   23.09     2.9     1.9     1.5.     .3     1.1       0       0
  54      QI       0       0       0               0       0       0       0

  55      KK COMBINE
  56      HC       2

  57      KK   DET_3
  SB      KO       0       0       0       0      21
  59      RS            STOR      -1
  60      SV       0    0.25    0.77    1.38    2.75    4.25    5.89     7.0    7.04    7.68
  61      SV    9.64   11.78   14.14   16.85
  62      SE   490.5     492     493     494     496     498     500  501.26   501.3     502
  63      SE     504     506     508     510
  64      SQ       0     5.3    18.7    36.9    58.7    83.7    97.3   101.5   111.5   141.9
  65      SQ   157.9   174.5   191. 7  209-4   227.6   246.3
  66      SE   490.5     492     494     496     498     500     501   501.3     502     504
  67      SE     505     506     507     508     509     510

  68      KK    3027
  69      KM   RUN DA.TE   9/2/2004
  70      KM   RAHONAL METHOD HYDROGRAPH PROGRAM
  71      KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
  72      KM   6HR RAI!fFl\:LL IS 1.17 INCHES
  73      KM   RATIONAL METHOD.RUNOFF COEFFICIENT IS  0.75
  74      KM   RATIONAL METHOD TIME OF CONCENTRATION IS  12  MIN.
  75      KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
  76      KM   IT 2 01JAN90 1200 200
  77      BA  0.0278
  78      IN      12 01JAN90    1154
  79      QI       0     0.9                             1.1     1.1     1.2     1.2      .3
  BO      QI     1.      1.S      .6     1.7      .8     2.1     2.      2.8     3.2      .6
  81      QI     7.1   22.81     3.7     2.5     1.9     1.6     1.4     1.3     1.1     1.1
  82      QI               0       0       0       0       0       0       0       0       0
  83      QI       0       0

  84      KK    3040
  85      KM   RUN DA.TE   9/24/2004
  86      KM   RATIONAL METHOD HYDROGRAPH PROGRAM
  87      KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
  88      KM   6HR RAINFALL IS  1.17  INCHES
  89      KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  0.75
  90      KM   RATIONAL METHOD TIME OF CONCENTRATION IS  8  MIN.
  91      KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
  92      KM   IT 2 OlJAN90 1200 200
  93      BA  0.0053
  94      IN       8 01JAN90    115.6
  95      QI       0     0.2     .0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2
  96      QI     0.2     0.2     0.2     0.2     0.3     0.3     0.3      0.      0.     0.3
  97      QI     0.J     0.4     0.4     0.4     0.5     0.5     0.6     0.7     0.8     1.1
  98      QI     1.5    5.93     0.9     0.6     0.5     0.4     0.4      0.     0.3     0.3
```

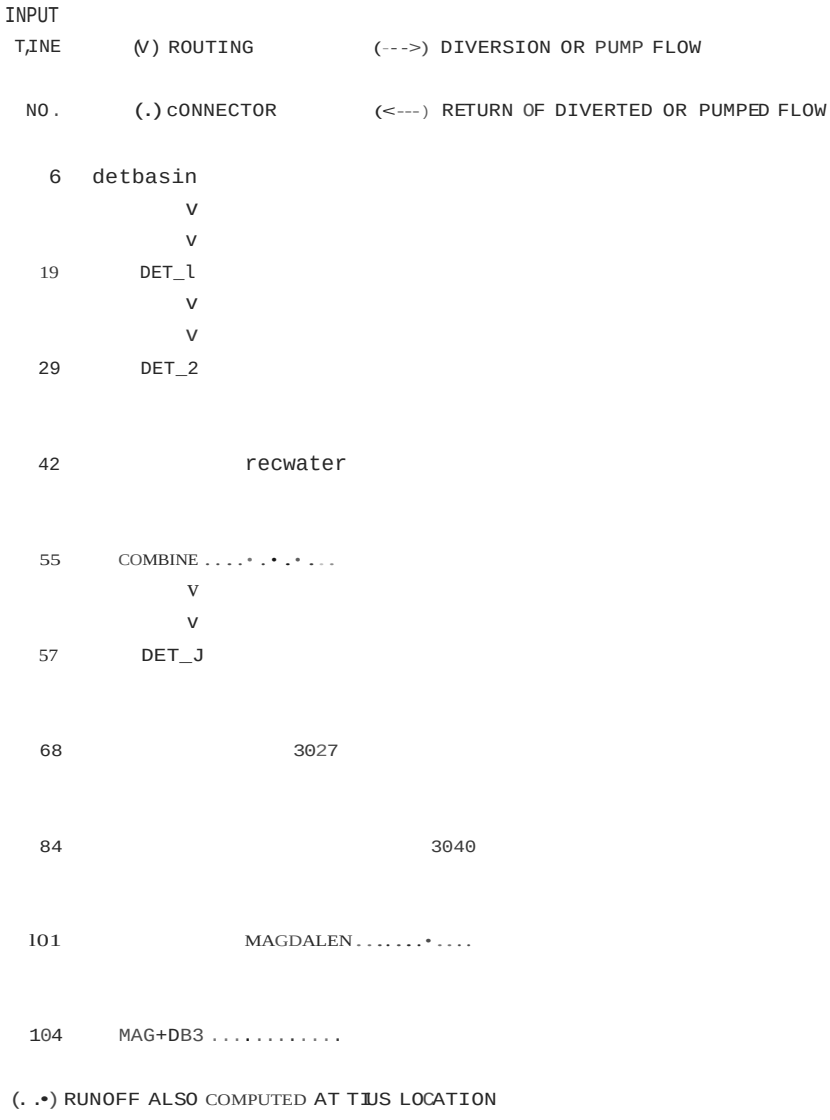
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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  99          QI     0.2     0.2     0.2     0.2     0.2     0.2       0       0       0       0
 100          QI       0       0       0       0       0       0       0

 101          KKMAGDALENA
 102          KM   COMBINES HYDROGRAPH FROM ROADWAY RATIONAL METHOD BASIN 3000 (PIPEFLOW)
 103          HC       2

 104          KK MAG+DBJ
 105          KM   COMBINES FLOW FROM MAGDALENA AND DB 3.
 106          HC       2
 107          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK



(..•) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
****************************************                                              ** ********

   FLOOD HYDROGRAPH PACKAGE   (HEC-1)                                     U.S. ARMY CORPS OF ENGINEERS
            JUN   1996                                                    HYOROLOG C ENGINEERING CENTER
          VERSION 4.1                                                         609 SECOND STREET
                                                                            DAVIS. CALIFORNIA 95616
   RUN DATE   28SEP04  TIME  11:14:16                                         (916) 756-1104

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



                         OTAY RANCH VILLAGE 7  J-14531
                         2-YEAR DETENTION ANALYSIS
                         9-23-04  FILENAME: 2Y_DB.HC1

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

   IT         HYDROGRAPH TIME DATA
                    NMIN          2  MINUTES IN COMPUTATION INTERVAL
                DATE 1JAN90  STARTING DATE ITIME
                           1200  STARTING TIME
                      NQ        200  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE     1JAN90   ENDING DATE
                  NDTIME       1838  ENDING TIME
                CENT             19  CENTURY MARK

                COMPUTATION INTERVAL     .03 HOURS
                     TOTAL TIME BASE    6.63 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


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

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

  57 KK         DET_3

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

  58 KO        OUTPUT CONTROL VARIABLES
                   IPRNT          5  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE
                   IPNCH          0  PUNCH COMPUTED HYDROGRAPH
```

IOUT	21	SAVE HYDROGRAPH ON THIS UNIT
ISAVl		FIRST ORDINATE PUNCHED OR SAVED
ISAV2	200	LAST ORDINATE PUNCHED OR SAVED
TIMINT	.083	TIME INTERVAL IN HOURS

\

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	detbasin	294.	4.17	36.	33.	33.	.35		
ROUTED TO	DET_1	263.	4.20	36.	33.	33.	.35	522.78	4.20
ROUTED TO	DET_2	230.	4.30	36.	33.	33.	.35	516.99	4.30
HYDROGRAPH AT	recwater	22.	4.20	3.	3.	3.	.03		
2 COMBINED AT	COMBINE	246.	4.30	39.	36.	36.	.38		
ROUTED TO	DET 3	103.	4.57	36.	33.	33.	.38	501.43	4.57
HYDROGRAPH AT	3027	23.	4.10	3.	2.	2.	.03		
HYDROGRAPH AT	3040	6.	4.07	0.	0.	0.	.01		
2 COMBINED AT	MAGDALEN	27.	4.10	3.	3.	3.	.04		
2 COMBINED AT	MAG+DB3	106.	4.57	39.	36.	36.	.42		

NORMAL END OF HEC 1 •••

\0 -de-r

********** ...******* .*** **********

FLOOD HYDROGRAPH PACKAGE (HEC-1) *
Jilli 1998
VERSION 4.l *

RUN DATE 2BSEP04 TIME 11:18:43

****

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

****

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

TBIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HECl (JAN 73), HEClGS, HEClDB, AND HEClKW.

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

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

• FREE ***

          •DIAGRAM
          ID   OTAY RANCH VILLAGE 7  J-14531
        2 ID   10-YEAR DETENTION ANALYSIS
          ID   9-23-04  FILENAME: lOY DET.HCl
          IT         01JAN90    1200     400
        5 IO              0

        6 KKdetbasin
          KM   RUN  DATE   9/.24/2004
        8 KM   RATIONAL METHOD HYDROGRAPH PROGRAM
        9 KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
       10 KM   6HR RAINFALL IS  1.73  INCHES
       11 KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  0.827
       12 KM   RATIONAL METHOD TIME OF CONCENTRATION IS  18  MIN.
       13 KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
       14 BA  0.3515
       15 IN      18 OlJAN90    1157
       16 QI       0    19.4    20.8    21.6    23.5    24.6    27.3    28.9    33.2    35.9
       I7 QI    43.9     50    73.5    27.4  447.22    58.9    39.4    30.9    25.8    22..5
       18 QI    20.1            0       0       0       0       0       0       0       0
       19 QI       0       0

       20 KK   DET_l
       21 KM   WATER QUALITY VOL= 2.34 AC-FT AT ELEVATION 521.0.  THE MAXIMUM
       22 KM   DISCHARGE·TO DRAIN THE WQ VOL JN 48 HRS IS 0.85 CF'S WITH A 4" DIAM ORIFICE.
          •KO 0,0,0,0,21
       23 RS            STOR      -1
       24 SV       0    .158    .755   l.517   2.342   3.229   4.18l   5.201
       25 SE     517     518     519     520     521     522     523     524
       26 SQ       0    0.85   13.11   37.42   69.34  107.68  151.77  201.19  255.66 314.96
       27 SQ  378.92  447.43  520.39  597.72
       29 SE     517     521  521.25   521.S  521.75     522  522.25   522.5  522.75   523.0
       29 SB  523.25   52).5  523.75     524

       30 KK   DET_2
       31 KM   WATER QUALITY VOL= 6.8 AC-FT AT ELEVATION 514.5.  THE MAXIMUM
       32 KM   DISCHARGE TO DRAIN THE WQ VOL  IN 49 HRS  IS 3.27 CF'S WITH  A  6" DIAM ORIFICE.
       33 KM   THE Qwq  INCLUDES THE  0.85 CFS FROM DET  l.
          * KO 0,0,0,0,21
       34 RS            STOR      - 1
       35 SV       0    .034    .309    .761   1.335   1.947   2.596    3.28    3.99   4.755
       36 SV   6.377   7.245   8.151   9.097  10.084  ll.116  12.193
       37 SE   503.5     504     505     506     507     508     509     510     511     512
       39 SE:    514     515     516     517     519     519     520
       39 SQ       0    3.27    6.29   18.12   33.88   53.08  100.99  160.52  231.61  314.01
       40 SQ  405.20  433.17  459.45
       4I SE    503.5   514.5  514.75     515  515.25   515.5     516   516.5     517   517.5
       42 SE:    518   518.5     519
```

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

  43      KKrecwater
  44      KM   RUN DATE   9/24/2004
  45      KM   RATIONAL METHOD HYDROGRAPH PROGRAM
  46      KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
  47      KM   6HR RAINFALL IS  1.73  INCHES
  48      KM   RATrONAL METHOD RUNOFF COEFFICIENT IS  0.72
  49      KM   RATIONAL METHOD TIME OF CONCENTRATION rS  20  MIN.
  50      KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
  51      BA  0.0322
  52      IN      20 01JAN90    1150
  53      QI       0     1.5     1.6     .1.7     1.B       2     2.2     2.5     2.7     3.3
  54      QI      .7     5.5     0.3   35'11     4.4     2.9      .3     1.9     1.7       0
  55      QI       0       0       0        0       0       0       0       0       0       0

  56      KK COMBINE
  57      HC       2

  58      KK   DET_3
  59      KO       0       0       0        0      21
  60      RS       1    STOR      -1
  61      SV       0    0.25    0.77    1.38    2.75    4.25    5.89     7.0    7 04    7.68
  62      SV    9.64   10.05   11.78   14'14   16.85
  63      SE  490.5     492     493      494     496     498     500  501.26   501.3     502
  64      SE     504   504.4     506      508     510
  65      SQ       0     5.3    18.7    3?.9    5B.7    83.7    97'3   101.5   111.5   141.9
  66      SQ   157.9   174.5   191.7    209.4   227.6   246.3
  67      SE  490'5     492     494      496     498     500     501   501.3     502     504
  68      SE     SOS     506     507      508     509     510

  69      KK    3027
  70      KM   RUN DATE   9/24/2004
  71      KM   RATIONAL METHOD HYDROGRAPH PROGRAM
  72      KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
  73      KM   6HR RAINFALL IS  1.73  INCHES
  74      KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  0.75
  75      KM   RATIONAL METHOD TIM8 OF CONCENTRATION rS  12  MIN.
  76      KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
  77      BA  0.0278
  78      IN      12 01JAN90    1154
  79      QI             1.4     1.4     1.5     I.5     1.6     1.6     1.8     1.8      .9
  BO      QI       2     2.2     2.3     2.5     2.7     3'1     3.4     4.1     4.7     6.9
  Bl      QI      10   34_.27     5.5     3.7     2.9     2.4     2.1     1.9     1.7     1.6
  82      QI     1.4       0       0       0       0       0       0       0       0       0
  83      QI       0       0

  84      KK    J040
  B5      KM   RUN DATE   9/24/2004
  B6      KM   RATIONAL METHOD HYOROGRAPH PROGRAM
  87      KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
  88      KM   6HR RAINFALL IS  1.73  INCHES
  89      KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  0.75
  90      KM   RATIONAL METHOD TIME OF CONCENTRATION IS  8  MIN.
  91      KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
  92      BA  0.0053
```

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

  93      IN        8 OlJAN90    1156
  94      QI        0      0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.J
  95      QI      0.3      0.3     0.      0.4     0.4     0.4     0.4     0.4     0.4     0.5
  96      Ql      0.5      0.5     0.6     0.6     0.7     0.8     0.8             .2      .7
  97      QI      2.1     8.83     1.4     0.9     0.7     0.6     0.5     0.5     0.4     0 4
  98      Ql      0.4      0.3     0.3     0.3     0.3     0.3       0       0       0       0
  99      QI        0        0       0       0       0       0       0

 100      KKMAGDALENA
 101      KM   COMBINES HYDROGRAPH FROM ROADWAY RATIONAL METHOD BASIN 3000 (PIPEFLOW)
 102      HC        2

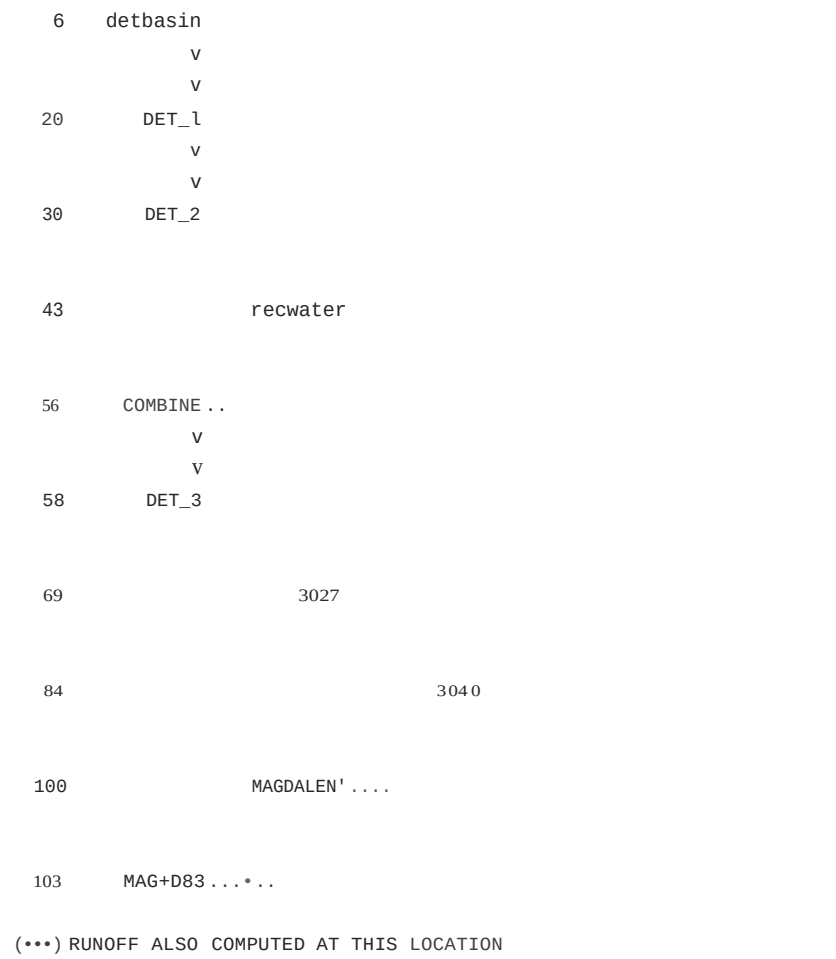
 103      KK MAG+DB3
 104      XM   COMBINES  FLOW  FROM  MAGDALENA  AND  DB  3.
 105      HC        2
 106      ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

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

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



(•••) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
FLOOD HYDROGRAPH PACKAGE (HEC-1) *                    U.S. ARMY CORPS OF ENGINEERS
            JUN 1998              *                  HYDROLOGIC ENGINEERING CENTER
          VERSION 4.1                                      609 SECOND STREET
                                                        DAVIS, CALIFORNIA 95616
 RUN DATE  28SEP04  TIME  11:18:43                        (916) 756-1104
```

OTAY RANCH VILLAGE 7 J-14531
10-YEAR DETENTION ANALYSIS
9-23-04 FILENAME: lOY DET.HCl

5 IO OUTPUT CONTROL VARIABLES

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

IT HYDROGRAPH TIME DATA

NMIN		MINUTES IN COMPUTATION INTERVAL
IDATE	1JAN90	STARTING DATE
ITIME	1200	STARTING TIME
NQ	400	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	lJAN90	ENDING DATE
NDTIME	1839	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .02 HOURS
TOTAL TIME BASE 6.65 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

58 KK DET 3

KO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE
IPNCH	0	PUNCH COMPUTED HYDROGRAPH

IOUT	21	SAVE llYDROGRAPH ON THIS UNIT
ISJ..Vl	1	FIRST ORDINATE PUNCHED OR SAVED
ISAV2	400	LAST ORDINATE PUNCHED OR SAVED
TIMINT	.017	TIME INTERVAL IN HOURS

RUNOFF SUMMARY

FLOW IN CUBIC FEET PER SECOND

TIME IN HOURS, AREA IN SQUARE MILES

OPERATlON	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLoW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIMS OF MAX STAGE
HYDROGRAPH AT	detbasin	447.	4.15	53.	48.	48.	.35		
ROUTED TO	DET_l	402.	4.18	53.	49.	49.	.35	523.JJ	.18
ROUTED TO	DET 2	358.	4.25	53.	48.	48.	.JS	517.74	4.25
HYDROGRAPH AT	recwater	35.	4.17	4.	4.	4.	.03		
2 COMBINED AT	COMBINE	385.	4.25	57.	52.	52.	.38		
ROUTED TO	DET_3	157.	4.52	52.	48.	48.	.38	504.94	4.52
HYDROGRAPH AT	3027	34.	4.10	4.	3.	3.	.03		
HYOROGRAPH AT	3040	9.	4.07	1.	1.	l.	.01		
2 COMBINED AT	MAGDALEN	41.	4.10	5.	4.	4.	.OJ		
2 COMBINED AT	MAG•DB3	161.	4.52	57.	52.	52.	.42		

NORMAL *END* OF HEC-1 •**

10 year

FLOOD HYDROGRAPH PACKAGE (HEC-1)
JUN 1990
VERSION 4.1

RUN DATE 10NOV04 TIME 14:14:25

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

```
)(      )(  XXXXXXX    XXXXX           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   X XXXXXXX  XXXXX            XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HECl (JAN 73), HEClGS, HEClDB, P.ND HEClKW.

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

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

FREE ***
                    •DIAGRAM
                    ID   OTAY RANCH VILLAGE 7  J-14531
                  2 ID   100-YEAR DETENTION ANALYSIS
                    ID   9-23-04  FILENAME: lOOY DB.HCl
                  4 IT         01JAN90    1200     400
                  5 IO       5

                  6 KKdetbasin
                  7 KM   RUN DATE   9/24/2004
                  8 KM   RATIONAL METHOD HYDROGRAPH PROGRAM
                  9 KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
                 10 KM   6HR RAINFALL IS  2.5  INCHES
                 11 KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  0.827
                 12 KM   RATIONAL METHOD TIME OF CONCENTRATION IS  17  MIN.
                 13 KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
                 14 BA  0.3515
                 15 IN      17 01JAN90    1154
                 16 QI           28.2    29.1    31.2    32.4    35.2    36.9    40.9    43.4    49.7
                 17 QI    53.9    65.9      75   110.2    62.7  648.96    88.4    59.1    46.     38.7
                 18 QI    33.7    30.l       0               0       0       0       0               0
                 19 QI       0       0       0

                 20 KK   DET 1
                 21 KM   WATER QUALITY VOL= 2.34 AC-FT AT ELEVATION 521.0.  THE MAXIMUM
                 22 KM   DISCHARGE TO DRAIN THE WQ VOL IN 48 HRS IS 0.85 CFS WITH A 4" DIAM ORIFICE.
                    •KO 0,0,0,0.21
                 23 RS            STOR      -1
                 24 SV       0    .158    .755   1.517   2.342   3.229   4.181   5.201
                 25 SE     517     518     519     520     521     522     523     524
                 26 SQ       0    0.85   13.11   37.42   69.34  107.68  151.77  201.19  255.66  311.96
                 27 SQ  378.92  447.43  520.39  597.72
                 28 SE     517     521  521.25   521.5  521.75     522  522.25   522.5  522.75   523.0
                 29 SE  523.25   523.5  523.75     524

                 30 KK   DET_2
                 31 KM   WATER QUALITY VOL= 6.8 AC-FT AT ELEVATION 514.5.  THE MAXIMUM
                 32 KM   DISCHARGE TO DRAIN THE WQ VOL IN 48 HRS IS 3.27 CFS WITH A 6" DIAM ORIFICE.
                 33 KM   THE Qwq INCLUDES THE 0.85 CFS FROM DET_l.
                    •KO 0,0,0,0,21
                 34 RS            STOR      -1
                 35 SV       0    .034    .309    .761   1.335   1.947   2.596    3.28    3.99   4.755
                 36 SV   6.377   7.245   8.151   9.097  10.084  11.116  12.193
                 37 SE   503.5     504     SOS     506     507     508     509     510     511     512
                 38 SE     514     515     516     517     518     519     520
                 39 SQ       0    3.27    6.29   18.12   33.88   53.08  100.89  160.52  231.61  314.01
                 40 SQ  105.20  433.17  459.45
                 41 SE   503.5   514.5  514.75     515  515.25   515.5     516   516.5     517   517.5
                 42 SE     518   518.5     519
```

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

 43       KKREC_WATER
 44       KM   RUN DATE   9/24/2004
 45       KM   RATIONAL METHOD HYDROGRAPH PROGRAM
 46       KM   COPYRfGHT 1992, 200I, RICK ENGlNEERfNG COMPANY
 47       KM   6HR RAINFALL rs 2.5 INCHES
 48       KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  0.72
 49       KM   RATIONAL METHOD TIME OF CONCENTRATION IS  18  MIN.
 50       KM   FOR THIS DATA TO RUN PROPERLY THrs IT CARD MUST BE ADDED TO YOUR HEC-1
 51       BA  0.0322
 52       JN      18 01JAN90    1157
 53       QI       0     2.2     2.4     2.5     2.7     2.8     3.1     3.3     3.8     4.1
 54       QI     5.1     5.8      .5     2.5   52.24     6.8     4.5      .6       3     2.6
 55       QI     2.3       0       0       0       0       0       0       0       0       0
 56       QI               0

 57       KK COMBINB
 58       HC       2

 59       KK   DET_3
 60       KO       0       0       0       0      21
 61       RS            STOR      -1
 62       SV       0    0.25    0.77    1.38    2.75    4.25    5.89     7.0    7.04    7.68
 63       SV    9.64   10.05   11.78   14.01   14.14   16.85
 64       SE   490.5     492     493     494     496     498     500  501.26   501.3     502
 65       SE     504   504.4     506   507.9     508     510
 66       SQ       0     5.3    18.7    36.9    58.7    83.7    97.3   101.5   111.5   141.9
 67       SQ   157.9   174'5   191.7   209.4   227.6   246.
 68       SE   490.5     492     494     496     498     500     501   501.3     502     504
 69       SE     505     506     507     508     509     510

 70       KK100y_3027b3
 71       KM   RUN DATE   11/10/2004
 72       KM   RATIONAL METHOD HYDROGRAPH PROGRAM
 73       KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
 74       KM   6HR RAINFALL rS  2.5  INCHES
 75       KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  0.75
 76       KM   RATIONAL METHOD TIME OF CONCENTRATION IS  11  MIN.
 77       KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-l
 78       BA.  0.0256
 79       JN      lI 01JAN90    1153
 80       QI       0     1.8     1.9     1.9       2     2.1     2.1     2.3     2.3     2.5
 81       QI     2.5     2.7     2.8     3.1     3.2     3.6     3.8     4.4     4.7     5.
 82       QI     6.6     9.6    19.3   43.06     7.7     5.2     4.1     3.4       3     2.6
 83       QI     2.4     2.2       2     1.9       0       0               0       0       0
 84       QI       0       0               0       0

 85       KKlOOy_3040B3
 86       KM   RUN DATE   9/24/2004
 87       KM   RATIONAL METHOD HYDROGRAPH PROGRAM
 88       KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
 89       KM   6HR RAINFALL IS  2.5  INCHES
 90       KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  0.75
 91       KM   RATIONAL METHOD TIME OF CONCENTRATION IS  8  MIN.
 92       KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-l
```

```
LINE      ID...•...1.......2.......3.......4.......5.......6.......7.......8...•...9.....10
   93     BA  0.0053
   94     lN        a 01JAN90    1156
   95     QI        0     0.4      0.4      0.4      0.4      0.4      0.4      0.4      0.4      0.5
   96     QI      0.5     0.5      0.5      o'.5     0.5      0.6      0.6      0.6      O.6      0.7
   97     QI      0.7     0.a      0.9      0.9               1.1      1.2      1.5      1.7      2.5
   98     QI        3   12.85        2      1.J               0.9      0.8      0.7      0.6      0.6
   99     QI      0.5     0.5      0.5      0.4      0.4      0.4        0        0        0        0
  100     QI        0       0        0        0        0        0        0

  101     KKMAGDALBNA
  102     KM   COMBINES HYDROGRAPH FROM ROADWAY RATIONAL METHOD BASIN 3000 (PIPBFLOW)
  103     HC        2

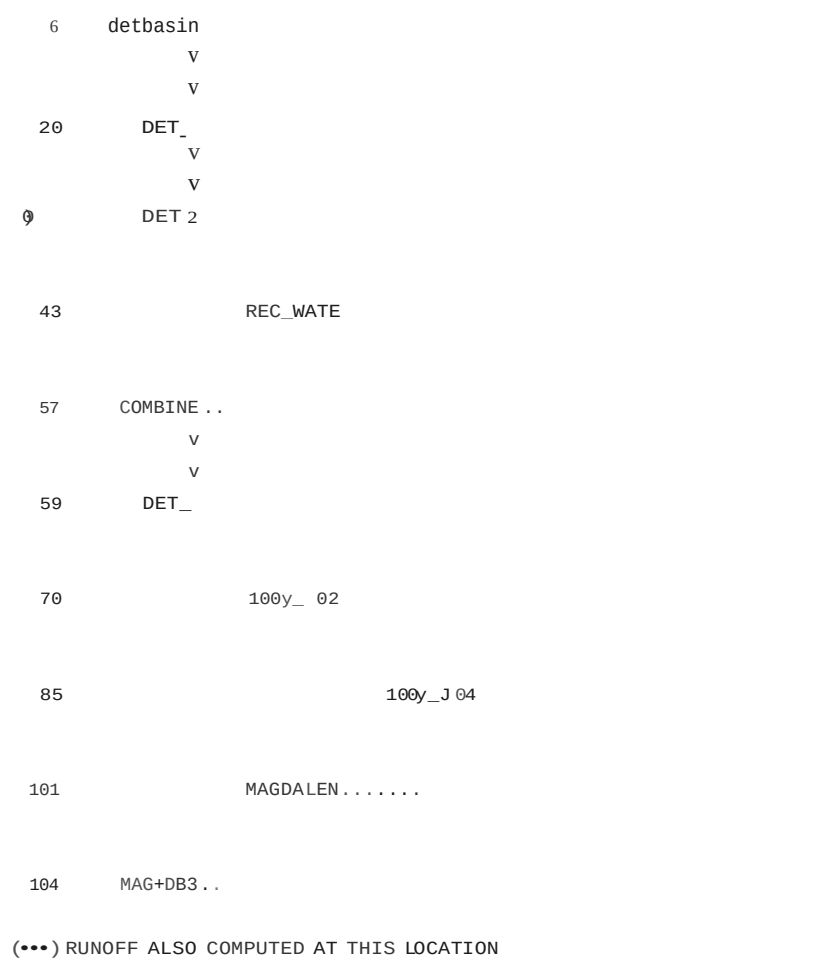
  104     KK MAG+DB3
  105     KM   COMBINES FLOW FROM MAGDALENA AND DB 3.
  106     HC        2
  107     ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPITT'

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

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



(•••) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*************************************i• ••                                              [redacted]

  FLOOD HYDROGRAPH PACKAGE   ( HEC-1)                                       *   U.S. ARMY CORPS OF ENGINEERS
          JUN   1998                                                            HYDROLOGIC ENGINEERING CENTER
        VERSION 4.1                                                                  609 SECOND STREET
                                                                                   DAVIS, CALIFORNIA 95616
 RUN DATE   10NOV04   TIME   14:14:25   *                                             19L6) 756-1104

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




                         OTAY RANCH VILLAGE 7  J-14531
                         100-YEAR DETENTION ANALYSIS
                         9-23-04  FILENAME: lOOY_DB.HCl

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

    IT          HYDROGRAPH TIME DATA
                      NMIN          1  MINUTES IN COMPUTATION INTERVAL
                     IDATE     lJAN90  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ        400  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     1JAN90  ENDING DATE
                    NDTIME       1839  ENDING TIME
                     ICENT         19  CENTURY MARK

                   COMPUTATION INTERVAL     .02 HOURS
                        TOTAL TIME BASE    6.65 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


**• *** *** *** *** *•* *** *** *** *** *** ** *** *** *** **• **A   - **- *** *** *** *** *** *** *** •*A **• ••* **" *** *•* **

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

 59 KK              DET 3

             ******"****'II' *

  0 KO.         OUTPUT CONTROL VARIABLES
                     IPRNT          S  PRINT CONTROL
                      PLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
```

IOUT	21	SAVE HYDROGRAPH ON THIS UNIT
ISAV1	1	FIRST ORDINATE PUNCHED OR SAVED
ISAV2	400	LAST ORDINATE PUNCHED OR SAVED
TIMINT	.017	TIME INTERVAL IN HOURS

RUNOFF SUMMARY

FLOW IN CUBIC FEET PER SECOND

TIME lN 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	detbasin	649.	4.15	77.	70.	70.	.35		
ROUTED TO	DET_l	590.	4.18	77.	70.	70.	.35	523.98	4.18
ROUTED TO	DET_2	466.	4.28	77.	70.	70.	.35	519.12	4.28
HYDROGRAPH AT	REC_WATE	52.	4.15	6.	6.	6.	.0J		
2 COMBINED AT	COMBINE	500.	4.27	83.	76.	76.	.38		
ROUTED TO	DET_3	227.	4.50	78.	71.	71.	.38	508.94	4.50
HYDROGRAPH AT	100y_302	43.	4.10	5.	5.	5.	.OJ		
HYDROGRAPH AT	100y_304	13.	4.07	1.	1.	1.	.01		
2 COMBINED AT	MAGDALEN	53.	..10	6.	6.	6.	.0J		
2 COMBINED AT	MAG•DB3	2JJ.	4.50	84.	77.	77.	-41		

• NORMAL END OF HECl •••

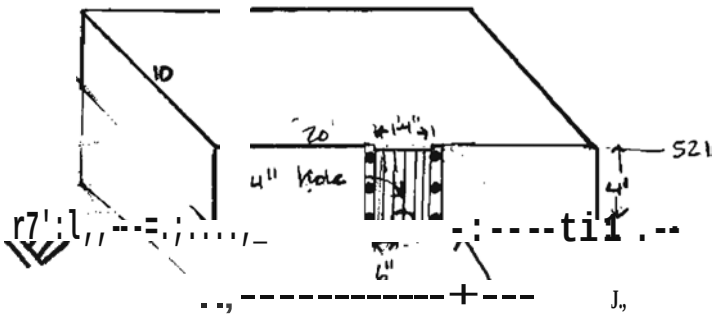
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14531

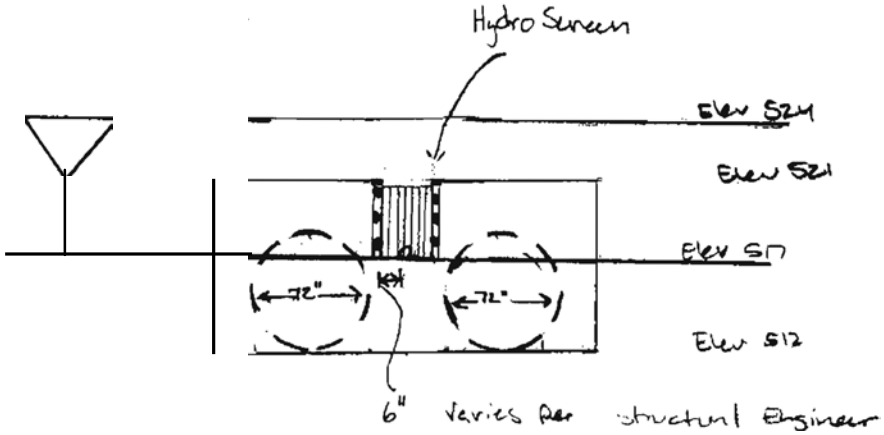
OTAY RANCH Village 7

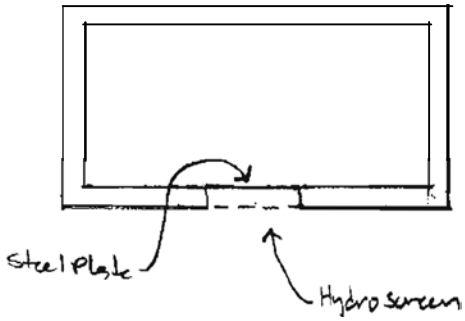
DB #1 20x10 Box

Not to scale



Top View





Type .... Vol: Elev-Area
Name .... VOL.E-A 1

Basin #1

7ile .... W:\14531\PONDPACK\BASINl-l.PPK
ritle ... Basin 1 of 3

Elevation (ft)	Planimeter (sq.in)	Area (acres)	Al+A2+sqr(Al*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
517.00	-----	.0000	.0000	.000	.000
518.00	-----	.4750	.4750	.158	.158
519.00	-----	.7280	1.7910	.597	.755
520.00	-----	.7950	2.2838	.761	1.517
522.00	-----	.9190	2.5688	1.713	3.229
524.00	-----	1.0540	2.9572	1.971	5.201

Elevations With Areas Interpolated From
The Closest Two Planimeter Readings

Elevation (ft)	Planimeter (sq.in)	Area (acres)	Al+A2+sqr(Al*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
521.00		.8559	2.4758	.825	2.342
523.00		.9853	2.8559	.952	4.181

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Areal + Area2 + sq.rt.(Areal*Area2))

where: ELl, EL2 Lower and upper elevations of the increment
Areal,Area2 Areas computed for ELl, EL2, respectively
Volume Incremental volume between ELl and EL2

Interpolated area from closest two given contour areas
is computed using the relationship:

IA = (sq.rt(Areal) + ((Ei-El)/(E2 -El))*(sq.rt(Area2)-sq. rt(Area1)))**2

where: El, E2 Closest two elevations with planimeter data
Ei Elevation at which to interpolate area
Areal,Area2 Areas computed for El, E2, respectively
IA = Interpolated area for Ei

Name .... CONCRETE BOX RIS

ile....W:\14531\PONDPACK\BASINl-l.PPK
ritle... CONCRETE BOX RISER AT ELEV. 521.0

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 521.00 ft
Increment = .25 ft
Max. Elev.= 524.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (Upstream to DnStream)
<--- Reverse Flow Only (DnStream to Upstream)
<---> Forward and Reverse Both Allowed

Structure	No.	Outfall	El, ft	E2, ft
Weir-XY Points	1	---> TW	521.000	524.000

TW SETUP, DS Channel

Basin #1

File .... W:\14531\PONDPACK\BASIN1-1.PPK
Title ... CONCRETE BOX RISER AT ELEV. 521.0

OUTLET STRUCTURE INPUT DATA

Structure ID = 1
Structure Type = Weir-XY Points

# of Openings = 1
WEIR X-Y GROUND POINTS

X, ft	Elev, ft
100.00	524.00
106.00	521.00
146.00	521.00
152.00	524.00

Lowest Elev. = 521.00 ft.

Weir Coeff. 2.600000

Weir TW effects (Use adjustment equation)

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 30
Min. TW tolerance .01 ft
Max. TW tolerance .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .10 cfs
Max. Q tolerance = .10 cfs

Basin #1

Type .... Composite Rating Curve
Name ...: CONCRETE BOX RIS

Bile .... W:\14531\PONDPACK\BASINl -l.PPK
Title ... CONCRETE BOX RISER AT ELEV. 521.0

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Elev. ft	Total Q, Q cfs	Converge, TW Elev ft	Converge, Error +/- ft	Notes, Contributing Structures
521.00	.00	Free Outfall		1
521.25	13.11	Free Outfall		1
521.50	37.42	Free Outfall		1
521.75	69.34	Free Outfall		1
522.00	107.68	Free Outfall		1
522.25	151.77	Free Outfall		1
522.50	201.19	Free Outfall		1
522.75	255.66	Free Outfall		1
523.00	314.96	Free Outfall		1
523.25	378.92	Free Outfall		1
523.50	447.43	Free Outfall		1
523.75	520.39	Free Outfall		1
524.00	597.72	Free Outfall		1

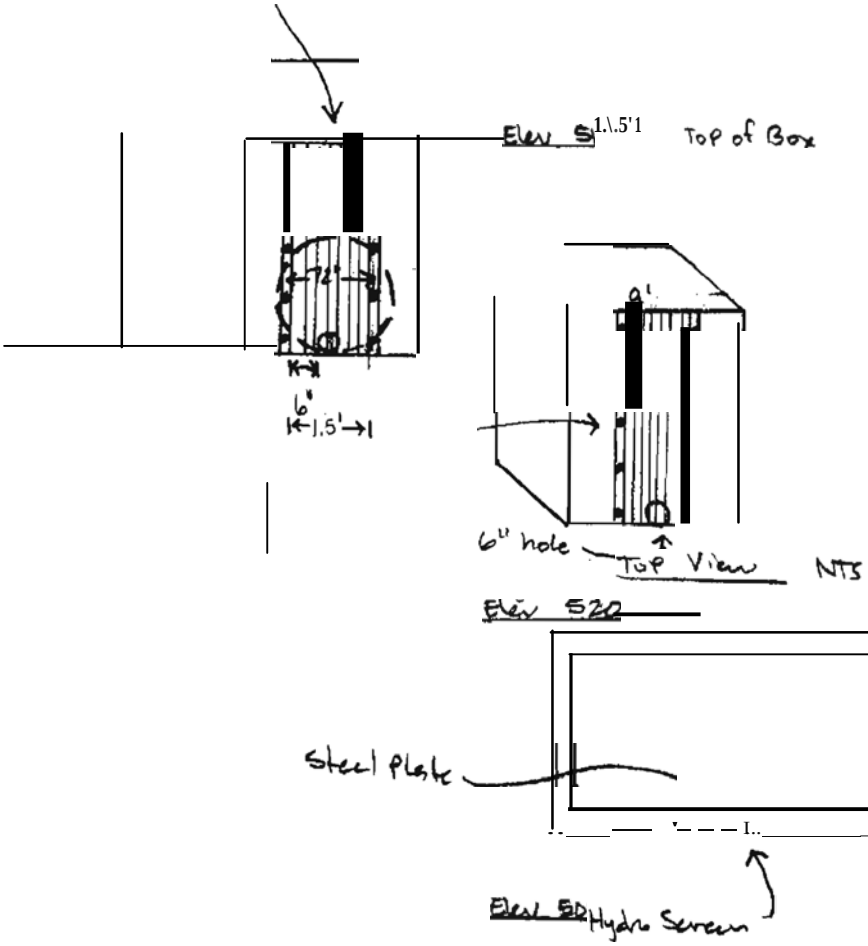
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OTAY RANCH Village 7

DB # 2 HydroScreen

Not to Scale

Elev 503.5'



DB #2

Type.... Vol: Elev-Area
Name .... VOL.E-A 10

ile .... W:\14531\PONDPACK\BASIN2-1.PPK
Title ... Basin 2 of 3

Elevation (ft)	Planirneter (sq.in)	Area (acres)	Al+A2+sqr(Al*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
503.50	-----	.0000	.0000	.000	.000
504.00	-----	.2010	.2010	.034	.034
506.00	-----	.5560	1.0913	.728	.761
508.00	-----	.6310	1.7793	1.186	1.947
510.00	-----	.7020	1.9986	1.332	3.280
512.00	-----	.7740	2.2131	1.475	4.755
514.00	-----	.8490	2.4336	1.622	6.377
516.00	-----	.9250	2.6602	1.773	8.151
518.00	-----	1.0090	2.9001	1.933	10.084
520.00	-----	1.1000	3.1625	2.108	12.193

Elevations With Areas Interpolated From
The Closest Two Planirneter Readings

Elevation (ft)	Planirneter (sq.in)	Area (acres)	Al+A2+sqr(Al*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
505.00	-----	.3564	.8250	.275	.309
507.00	-----	.5929	1.7231	.574	1.335
509.00	-----	.6660	1.9453	.648	2.596
511.00	-----	.7376	2.1591	.720	3.999
514.50	-----	.8677	2.5750	.429	6.807
515.00	-----	.8866	2.6032	.868	7.245
517.00	-----	.9665	2.8371	.946	9.097
519.00	-----	1.0540	3.0943	1.031	11.116

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Areal + Area2 + sq.rt.(Areal*Area2))

where: ELl, EL2 = Lower and upper elevations of the increment
Areal,Area2 = Areas computed for ELl, EL2, respectively
Volume = Incremental volume between ELl and EL2

Interpolated area from closest two given contour areas
is computed using the relationship:

IA = (sq.rt(Areal) + ((Ei-El)/(E2- El))*(sq.rt(Area2)- sq.rt(Area1)))**2

where: El, E2 = Closest two elevations with planimeter data
Ei = Elevation at which to interpolate area
Areal,Area2 = Areas computed for El, E2, respectively
IA = Interpolated area for Ei

DB#2

lile .... W:\14531\PONDPACK\BASIN2-1.PPK
Title ... WEIR FROM RISER

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 514.50 ft
Increment = .50 ft
Max. Elev.= 519.00 ft

Spot Elevations, ft
514.75
515.25

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (Upstream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.	Outfall	El, ft	E2, ft
Weir-XY Points	--->	TW		519.000
TW SETUP, DS Channel			514.50	
		0		

S/N:
HOMOL0147845 Ric
Pond Pack Ver:
8-01-98 (61)

Date: 09-28-2004

DB#2

File .... W:\14531\PONDPACK\BASIN2 1.PPK
Title ... WEIR FROM RISER

OUTLET STRUCTURE INPUT DATA

Structure ID
Structure Type = Weir-XY Points

# of Openings = 1
WEIR X-Y GROUND POINTS

X, ft	Elev, ft
100.00	519.00
109.00	514.50
128.00	514.50
137.00	519.00

Lowest Elev. = 514.50 ft

Weir Coeff. = 2.600000

Weir TW effects (Use adjustment equation)

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES ...
Maximum Iterations= 30
Min. TW tolerance = .01 ft
Max. TW tolerance .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance .01 ft
Min. Q tolerance = .10 cfs
Max. Q tolerance .10 cfs

DB #2

Type.... Composite Rating Curve
Name.... WEIR SX9

.<ile.... W:\14531\PONDPACK\BASIN2 1.PPK
Title... WEIR FROM RISER

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q				Notes
Elev. ft	Q cfs	TW Elev ft	Converge Error +/-ft	Contributing Structures
514.50	.00	Free Outfall		
514.75	6.29	Free Outfall		
515.00	18.12	Free Outfall		
515.25	33.88	Free Outfall		
515.50	53.08	Free Outfall		
516.00	100.89	Free Outfall		
516.50	160.52	Free Outfall		
517.00	231.61	Free Outfall		
517.50	314.01	Free Outfall		
518.00	407.73	Free Outfall		
518.50	512.86	Free Outfall		
519.00	629.52	Free Outfall		

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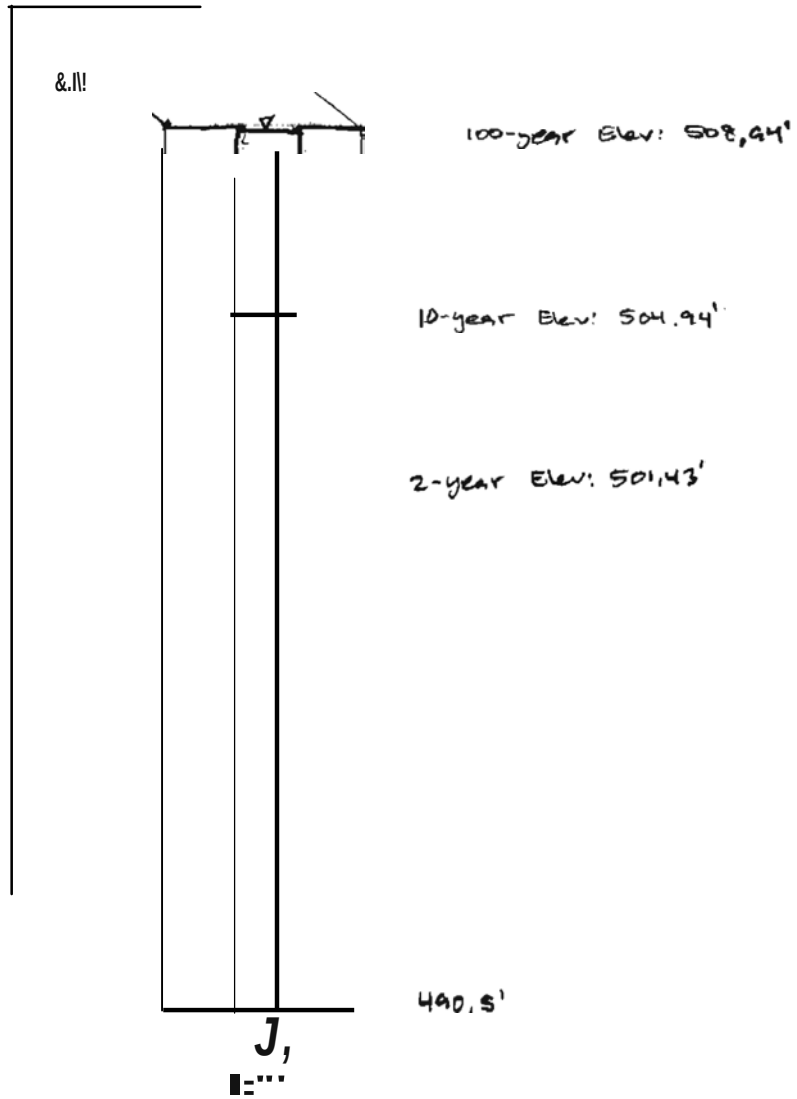
5620 Friars Rd., San Diego. alifornia 92110-2596 • (619) 291-3568 • www.nckengm rin .oom g

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0f1¥1 VIII.

DB #3



L=1.1' OB#3 J-14531

Outiet Structure File: ORV7DB3W.STR

POND-2 Version: 5.17 S/N: 1295130253
Date Executed: Time Executed:

****
OTAY RANCH VILLAGE 7 WEIR

****

***** COMPOSITE OUTFLOW SUMMARY ****

Elevation (ft)	Q (cfs)	Contributing Structures
490.SO	0.0	1
491.00	1.O	1
491.50	2.9	1
492.00	5.3	1
492.50	8.1	1
493.00	11.3	1
493.SO	14.9	1
494.00	18.7	1
494.50	22.9	1
495.00	27.3	1
49S.SO	32.0	1
496.00	36.9	1
496.50	42.0	1
497.00	47.4	1
497.50	53.0	1
498.00	S8.7	1
498.SO	64.7	1
499.00	70.9	1
499.50	77.2	1
500.00	83.7	1
500.50	90.4	1
501.00	97.3	1
501.10	98.7	1
501.30	101.5	1
501.50	104.3	1
502.00	111.5	1
502.50	118.9	1
503.00	126.4	1
503.50	134.1	1
504.00	141.9	1
504.50	149.8	1
505.00	157.9	1
SOS.SO	166.2	1
S06.00	174.5	1
S06.SO	183.0	1
507.00	191.7	1
507.SO	200.S	1
508.00	209.4	1
S08.SO	218.4	1
509.00	227.6	1
509.50	236.9	1
510.00	246.3	1
Sl0.10	0.0	

DB#3

POND-2 Version: 5.17 S/N: 1295130253
Date Executed: Time Executed:

****
OTAY RANCH VILLAGE 7 WEIR

****

Outlet Structure File: ORV7DB3W.STR
Planimeter Input File: *** NONE ***
Rating Table Output File *** NONE ***

Min. Elev. (ft) 490.5 Max. Elev. (ft) 510.1 Iner. (ft) .5

Additional elevations (ft) to be included in table:
* *
501.3 501.1

********** **********
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-XY	1		->	1

Outflow rating table was not stored to disk.

DB#3

Outlet Structure File: ORV7DB3W.STR

POND-2 Version: 5.17 S/N: 1295130253
Date Executed: Time Executed:

****
OTAY RANCH VILLAGE 7 WEIR

**********k********

>>>>>> Structure No. 1 <<<<<<
(Input Data)

WEIR-XY
Weir - Defined by X, Y Coordinates
E1 (ft) =490.5 E2 (ft) =510.1

X dist. (ft)	Y elev. (ft)
100	510
100	490.5
101.1	490.5

DB#3

101.1 510

DB#3

POND-2 Version: 5.17
S/N: 1295130253

OTAY RANCH VILLAGE 7
DETENTION BASIN 3
SEPTEMBER 28, 2004

CALCULATED 09-28-2004 08:37:36
DISK FILE: ORV7DB3 .VOL

Planimeter scale: 1 inch 1 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)		Volume (acre-ft)	Volume Sum (acre-ft)
490.50	0.00	0.00	0.00		0.00	0.00
492.00	21,344.40	0.49	0.49		0.25	0.25
493.00	*I*	0.57	1.58	0.53		0.77
494.00	28,314.00	0.65	1.70		1.14	1.38
496.00	31,363.20	0.72	2.05		1.37	2.75
498.00	33,976.80	0.78	2.25		1.50	4.25
500.00	37,461.60	0.86	2.46		1.64	5.89
501.26	*I*	0.90	2.65	1.11		7.00
501.30	*I*	0.91	2.65	1.15		7.04
502.00	40,510.80	0.93	2.68		1.79	7.68
504.00	44,866.80	1.03	2.94		1.96	9.64
506.00	48,351.60	1.11	3.21		2.14	11.78
508.00	54,450.00	1.25	3.54		2.36	14.14
510.00	64,033.20	1.47	4.08		2.72	16.85

I ---> Interpolated area from closest two planimeter readings.

$$IA = (sq.rt(Area1) + ((Ei-E1)/(E2-E1))*(sq.rt(Area2)-sq.rt(Area1)))^2$$

where:
- E1, E2 — Closest two elevations with planimeter data
- Ei — Elevation at which to interpolate area
- Area1, Area2 — Areas computed for E1, E2, respectively
- IA — Interpolated area for Ei

* Incremental volume computed by the Conic Method for Reservoir Volumes.

$$Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))$$

where:
- EL1, EL2 — Lower and upper elevations of the increment
- Area1, Area2 — Areas computed for EL1, EL2, respectively
- Volume — Incremental volume between EL1 and EL2

APPENDIX I

Desilting Basin Calculations

Basin 4000

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL .DISTRICT
                         1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2000 Advanced Engineering Software (aes)
              Ver. l.SA Release Date: 01/01/2000  License ID 1261

                              Analysis prepared by:

                            Rick Engineering Company
                                 620 Friars Road
                               San Diego, CA  92110
                                  (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
 * McMILLIN OTAY RANCH, VILLA.GE 7                                        *
 * 10-YEAR SOTRM EVENT TO SIZE BASIN 4000                                 *
* J-14531A    JUNE 9, 2004   BY: AKW                                      *
 **************************************************************************

  FILE NAME: A:\4000.DAT
  TIME/DATE OF STUDY: 13:23 06/09/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  1981 SAN DIEGO HYDROLOGY MANUAL RAINFALL INFORMATION USED

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.650
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   {BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:   CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL   IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY     (FT)    {FT)  (FT)  (FT)    (n)

  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*{Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE   4000.00 TO NODE   4001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED{GLOBAL) :
```

```
  RURAL DEVELOPMENT RUNOFF COEFFICIENT =  .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED  (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MINUTES ADDED     7.29 {MINUTES}
  INITIAL SUBAREA FLOW-LENGTH =   130.00
  UPSTREAM ELEVATION =    576.30
  DOWNSTREAM ELEVATION =     572.50
  ELEVATION DIFFERENCE =       3.80
    10 YEAR RAINFALL INTENSITY(INCH/HOUR)     2.956
  SUBAREA RUNOFF(CFS)         0.38
  TOTAL AREA{ACRES) =       0.20   TOTAL RUNOFF{CFS)         0.38

****************************************************************************
  FLOW PROCESS FROM NODE   4001.00 TO NODE   4002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================c=========================== ==== =   ==============
  ELEVATION  DATA: UPSTREAM(FEET) =  572 .50  DOWNSTREAM{FEET)      570.50
  CHANNEL LENGTH THRO SUBAREA {FEET) =  160.00  CHANNEL SLOPE    0.0125
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.38
  FLOW VELOCITY(FEET/SEC} =   1.28   FLOW DEPTH(FEET) =   0.13
  TRAVEL TIME(MIN.) =  2.08   Tc{MIN.) =   9.37
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4002.00     290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4002.00 TO NODE   4002.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.659
  *USER SPECIFIED(GLOBAL):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER {AMC II) =   0
  SUBAREA AREA(ACRES) =   0.74    SUBAREA RUNOFF(CFS)      1.28
  TOTAL AREA{ACRES) =     0.94   TOTAL RUNOFF(CFS) =    1.66
  TC(MIN) =   9.37
================================= ================================ ========
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)            0.94   TC(MIN.) =      9.37
  PEAK FLOW RATE(CFS)   =      1.66
======a =============== ==================================================
==================   ======================================================
  END OF RATIONAL METHOD ANALYSIS
```

1

(

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2000 Advanced Engineering Software (aes)
              Ver. l.5A Release Date: 01/01/2000  License ID 1261

                            Analysis prepared by:

                          Rick Engineering Company
                              5620 Friars Road
                            San Diego, CA  92110
                              (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
* McMILLIN OTAY RANCH, VILLAGE 7                                          *
* 100-YEAR STORM EVENT TO SIZE BASIN 4000                                 *
* J-14531A     JUNE 9, 2004   BY: AKW                                     *
 **************************************************************************

  FILE NAME: A:\100-4000.DAT
  TIME/DATE OF STUDY: 13:28 06/09/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
 .RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  6.300
   2)  10.000;  4.000
   3)  15.000;  3.100
   4)  20.000;  2.600
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.600
   8)  50.000;  1.400
   9)  60.000;  1.300
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.650
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO  STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)

  1   30.0     20.0    0.018/0.018/0.020    0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```

```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

************************************ ********************** ***************
  FLOW PROCESS FROM NODE    4000.00 TO NODE    4001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==================== ============== ============ ======================
  *USER SPECIFIED(GLOBAL):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A}
  TIME OF CONCENTRATION WITH  6-MINUTES ADDED     7.29(MINUTES}
  INITIAL SUBAREA FLOW-LENGTH =   130.00
  UPSTREAM ELEVATION =    576.30
  DOWNSTREAM ELEVATION =    572.50
  ELEVATION DIFFERENCE =      3.80
   100 YEAR RAINFALL INTENSITY(INCH/HOUR}     5.246
  SUBAREA RUNOFF(CFS}        0.68
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS)        0.68

****************************** ****************************************** ****
  FLOW PROCESS FROM NODE    4001.00 TO NODE    4002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    572.50  DOWNSTREAM(FEET)     570.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE    0.0125
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.68
  FLOW VELOCITY(FEET/SEC) =  1.60   FLOW DEPTH(FEET} =  0.18
  TRAVEL TIME(MIN.} =   1.66   Tc(MIN.) =   8.95
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4002.00     290.00 FEET.

************************************ ********************** ***************
  FLOW PROCESS FROM NODE    4002.00 TO NODE    4002.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========   =========  =========  ================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.481
  *USER SPECIFIED(GLOBAL):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)      0.74   SUBAREA RUNOFF(CFS)       2.16
  TOTAL AREA(ACRES) =     0.94   TOTAL RUNOFF(CFS} =    2.84
  TC(MIN) =   8.95
=============== = ==========  ================  ================  ===========
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      0.94   TC(MIN.) =      8.95
  PEAK FLOW RATE(CFS)    =      2.84
==========  =  ==========c=====  ======================
==========;======= ===========  ==========  =======
  END OF RATIONAL METHOD ANALYSIS
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1

Project McMillan Otay Ranch Village 7 Basin # 4000
Job # 14531A
Date 6/9/2004

NPDES Desilting Basin Calculations

Site Specific Data

Basin	4000
Node	4002
Total Area (ac)	0.9
P_6 = P of a 10 year, 6 hour event	1.7
C = Run-off Coefficient	0.65
D = Design Storm Duration (min)	360
V_s = Particle Settling Velocity	0.00024

Calculated Data

Q = CIAs (cfs) = Discharge Rate for Surface Area	0.17
A_s = Min. Surface Area = 1.2Q/Vs (sO	867
A_s = Min. Surface Area = 1.2Q/Vs (ac)	0.02
I = Intensity = $7.44xP^{-6.45}$ (in/hr)	0.28
Required Width (ft)	21.0
(ft	42.0

Assume the followin

Side Slope "Z"	2
Freeboard (ft)	2
Required Head (from Table 2)	0.2
Depth to Top of Riser (ft)	4
Silt Stora e D th ft	2

Dimensions of Basin

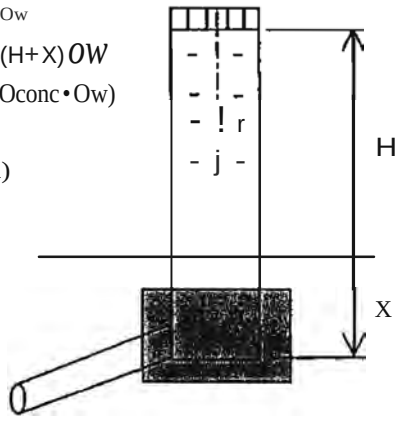
	Calculated	Use
Width (ft)	21	25
Length (ft)	42	50
Depth (ft)		6.2

Basin Desi

Basin Depth (ft)	6.2	Basin Side Slopes	2:1
Basin Bottom Width (ft)	9	Basin Top Width (ft)	33.8
Basin Bottom Length (ft)	34	Basin Top Length (ft)	58.8
Basin Bottom Area (ft)	306	Basin Top Area (ft)	1,987
Top of Primary Riser (ft)	4	Top of Secondary Riser (ft)	4.2
Surface Area at Top of Riser (ft^2)	1,250	Primary Riser Diameter (in) •	24
Silt Storage Volume (yd^3)	18.9	Second Riser Diameter (in •	24

Concrete Anchor Desi n

= Vriscr Ow
= m-2(H+X) OW
$F_{b\ anchor}$ = Vcone (Oconc • Ow)
$F_{b\ anchor}$ $F_{b\ riser}$
•• Vcone = 2.24r2(H+X)



Primarv RiSer Anchor

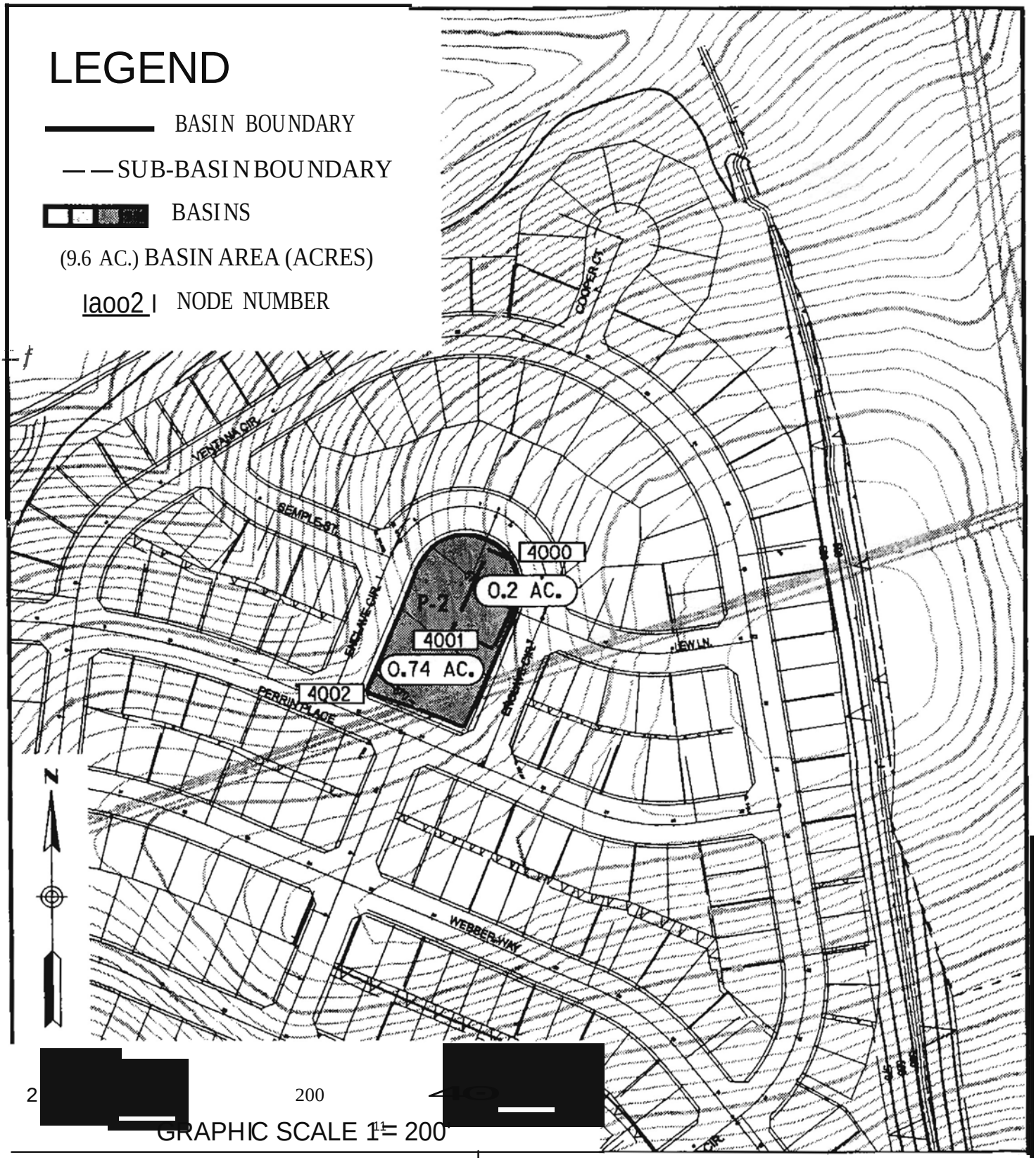
H = Height of Riser (ft)	4
X = Pipe Invert to Bottom of Basin (ft)	3
r = Radius of Riser (ft)	1
vconc (cy)	0.25

Secondary Riser Anchor

H = Height of Riser (ft)	4.2
X = Pipe Invert to Bottom of Basin (ft)	3
r = Radius of Riser (ft)	
Vconc (cy)	0.25

•From Table 2 and 10-yr Rational Method for Mass Graded Condition (Q_{10}=1.66 cfs)

•• From Table 2 and 100-yr Rational Method for Mass Graded Condition (Q_{100}=2.84 cfs)



DRAINAGE MAP 3 FOR: ULTIMATE CONDITION McMILLIN OTAY RANCH VILLAGE 7

RICK ENGINEERING COMPANY

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Basin 5000

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

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                       1965,1961 HYDROLOGY MANUAL
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            Ver. 1.SA Release Date: 01/01/2000  License ID 1261

                          Analysis prepared by:

                        Rick Engineering Company
                            5620 Friars Road
                          San Diego, CA  92110 ·
                            (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
 * MCMILLIN OTAY RANCH, VILLAGE 7                                         *
 * 10-YEAR STORM EVENT TO SIZB BASIN 5000                                 *
* J-14531A        JUNE 7, 2004          BY: AKW                           *
 **************************************************************************

  FILE NAME: A:/5000.DAT
  TIME/DATE OF STUDY: 17:23 06/07/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  1981 SAN DIEGO HYDROLOGY MANUAL RAINFALL INFORMATION USED

  USER SPECIFIED STORM EVENT(YEAR) "'  10.00
  SPECIFIED MINIMUM  PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
 . RAINFALL-INTENSITY  ADJUSTMENT  FACTOR = 1.000
  SAN DIEGO HYDROLOGY MANUAL "C" -VALUES USED FOR RATIONAL METHOD
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION  MODEL SELECTED.*
    (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES:   MANNING
     WIDTH   CROSSFALL  IN-   / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT}      (FT)    SIDE / SIDE/ WAY     (FT)    (FT)  (FT)   (FT)    (n)

  1   30.0     20.0    0.018/0.018/0.020    0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth "'  0.00 FEET
       as (Maximum Allowable Street Flow Depth} - (Top-of-Curb}
    2. (Depth}*(Velocity}  Constraint =  6.0  (FT*FT/S}
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

********  ****************************  ************************************
  FLOW PROCESS FROM NODE   5000.00 TO NODE   5001.00 IS CODB =  21

  >>> >>RATIONAL  METHOD  INITIAL SUBAREA ANALYSIS<< <<<
====•• zzc= ========================================= ========s=== =========
  *USER SPECIFIED(SUBAREA):
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  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX x A)
  TIME OF CONCENTRATION WITH  6-MINUTES ADDED     6.93(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =  200.00
  UPSTREAM ELEVATION =        587.20
  DOWNSTREAM ELEVATION =    554.80
  ELEVATION DIFFERENCE =      32.40
    10 YEAR RAINFALL INTENSITY(INCH/HOUR)    3.011
  SUBAREA RUNOFF(CFS)        0.90
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS)        0.90

****************************************************************************
  FLOW PROCESS FROM NODE   5001.00 TO NODE   5002.00 IS CODE = 51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====== = ======C=================================;======================
  ELEVATION DATA: UPSTREAM(FEET) =    554.80  DOWNSTREAM(FEET)     547.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00   CHANNEL SLOPE    0.0097
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.90
  FLOW VELOCITY(FEET/SEC) =  1.58   FLOW DEPTH(FEET) =   0.23
  TRAVEL TIME(MIN.) =   8.11   Tc(MIN.) =  15.04
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5002.00     970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==;==========================================  ======================  =======
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.118
   USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =  0
  SUBAREA AREA(ACRES)     11.30   SUBAREA RUNOFF(CFS)     17.95
  TOTAL AREA(ACRES) =    11.70   TOTAL RUNOFF(CFS) =   18.85
  TC(MIN) =  15.04
=========  ====  ===  ======;=======  ===  ======  ======  ==========  ======  =====
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     11.70  TC(MIN.) =     15.04
  PEAK FLOW RATE(CFS)   =     18.85
==========  ;==========  ===========  ==========  ;==========  =======  =====
==========  =======  ==========   ===========  ==========  ========
  END OF RATIONAL METHOD ANALYSIS
```

1

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

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Analysis prepared by!

Rick Engineering Company
5620 Friars Road
San Diego, CA 92110
(619) 291-0707

********** **DESCRIPTION OF STUDY** **********
* **MCMILLIN OTAY RANCH, VILLAGE 7** *
* **100-YEAR STORM EVENT TO SIZE BASIN 5000** *
* **J-14531A JUNE 7, 2004 BY: AKW** *
********** ********** **********

FILE NAME: A:\100-5000.DAT
TIME/DATE OF STUDY: 15:45 06/08/2004

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE 0.90
RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
*USER SPECIFIED:
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 9
1) 5.000; 6.300
2) 10.000; 4.000
3) 15.000; 3.100
4) 20.000; 2.600
5) 25.000; 2.200
6) 30.000; 2.000
7) 40.000; 1.600
8) 50.000; 1.400
9) 60.000; 1.300
SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.750
CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.
(BASED ON 07/1998 ADOPTED MANUAL)
NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.01B/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   5000.00 TO NODE   5001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================ ========================== ============================
  *USER SPECIFIED(GLOBAL):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MINUTES ADDED     6.93(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =   200.00
  UPSTREAM ELEVATION =        587.20
  DOWNSTREAM ELEVATION =    554.80
  ELEVATION DIFFERENCE =     32.40
   100 YEAR RAINFALL INTENSITY(INCH/HOUR)    5.412
  SUBAREA RUNOFF(CFS)        1.62
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS)       1.62

****************************************************************************
  FLOW PROCESS FROM NODE   5001.00 TO NODE   5002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRO SUBAREA (EXISTING ELEMENT)<<<<<
============== ============================================================
  ELEVATION DATA: UPSTREAM(FEET) =    554.80  DOWNSTREAM(FEET)       547.30
  CHANNEL LENGTH THRO SUBAREA{FEET) =   770.00   CHANNEL SLOPE    0.0097
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRO SUBAREA(CFS) =      1.62
  FLOW VELOCITY(FEET/SEC) =   1.94   FLOW DEPTH(FEET) =   0.32
  TRAVEL TIME(MIN.) =   6.61   Tc(MIN.) =  13.55
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5002.00     970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.362
  *USER SPECIFIED(GLOBAL):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)     11.30   SUBAREA RUNOFF(CFS)     28.49
  TOTAL AREA(ACRES) =    11.70   TOTAL RUNOFF(CFS) =   30.11
  .TC(MIN) =  13.55

  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)          11.70  TC(MIN.)=     13.55
  PEAK FLOW RATE(CFS)   =     30.11
============================================================================
================== ================================  ======================
  END OF RATIONAL METHOD ANALYSIS

1
```

Project McMillan Otay Ranch Village 7 Basin # 5000
Job # 14531A
Date *61812004*

NPDES Desilting Basin Calculations

Site Specific Data

Basin	5000
Node	5002
Total Area (ac)	11.7
P_6 = P of a 10 year, 6 hour event	1.7
C = Run-off Coefficient	0.75
D= Design Stonn Duration (min)	360
V_1= Particle Settling Velocity	0.00024

Calculated Data

Q = CIA, (cfs) = Discharge Rate for Surface Area	2.49
A,= Min. Surface Area = l.2QNs (sf)	12457
A.= Min. Surface Area = l.2QNs (ac)	0.29
I = Intensity=7.44xP D--0..cs(in/hr)	0.28
Required Width (ft)	79.0
ft	158.0

Assume the followio

Side Slope "Z"	2
Freeboard (ft)	2
Required Head (from Table 2)	0.9
Depth to Top of Riser (ft)	4
Silt Stora e De th ft	2

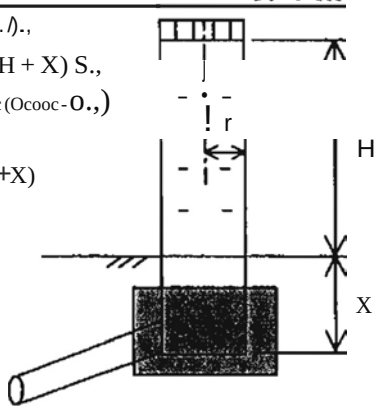
Dimensions or Basin	Calculated	Use
Width (ft)	79	80
Length (ft)	158	160
Depth (ft)		6.9

Basin Des·

Basin Depth (ft)	6.9	Basin Side Slopes	2:1
Basin Bottom Width (ft)	64	Basin Top Width (ft)	91.6
Basin Bottom Length (ft)	144	Basin Top Length (ft)	171.6
Basin Bottom Area (ft)	9,216	Basin Top Area {ft)	15,719
Top of Primary Riser (ft)	4	Top of Secondary Riser (ft)	4.9
Surface Area at Top of Riser (ft^2)	12,800	Primary Riser Diameter (in) *	30
Silt Stora e Volume d^3	373.3	Second Riser Diameter in **	24

Concrete Anchor Desi n

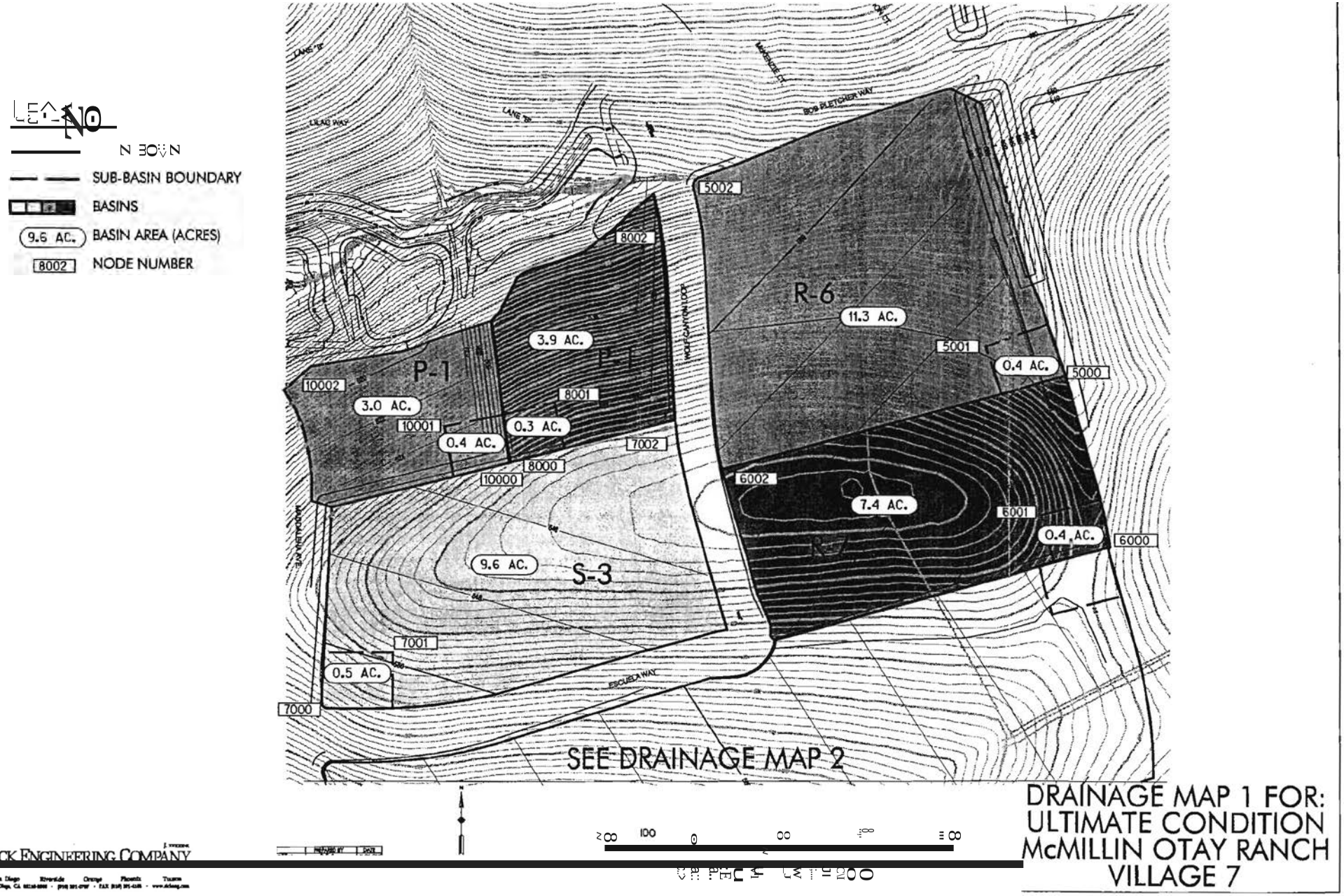
= Vn.e./).,
= m^2 (H + X) S.,
= Vconc (Ocooc - O.,)
Fbanchor 2: Fb riser
∴ V_{cone} = 2.24r2(H+X)



Primary Riser Anchor	
H = Height of Riser (ft)	4
X = Pipe Invert to Bottom of Basin (ft)	4
r = Radius of Riser (ft)	1.25
Vconc (cy)	0.52
Secondary Riser Anchor	
H = Height of Riser (ft)	4.9
X = Pipe Invert to Bottom of Basin (ft)	4
r = Radius of Riser (ft)	
Vcone (cy)	0.33

* From Table 2 and lO·yr Rational Method for Mass Graded Condition (Q_{10}= 18.85 cfs)

** From Table 2 and 100-yr Rational Method for Mass Graded Condition (Q_{100}=30.l l cfs)



RICK ENGINEERING COMPANY

DRAINAGE MAP 1 FOR:
ULTIMATE CONDITION
McMILLIN OTAY RANCH
VILLAGE 7

Basin 6000

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

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Analysis prepared by:

Rick Engineering Company
5620 Friars Road
San Diego, CA 92110
(619) 291-0707

********** DESCRIPTION OF STUDY **********
* MCMILLIN OTRAY RANCH, VILLAGE 7 *
* 10-YEAR STORM EVENT TO SIZE BASIN 6000 *
* J-14531A JUNE 8, 2004 BY: AKW" *
****

FILE NAME: A:/6000.DAT
TIME/DATE OF STUDY: 10:34 06/08/2004

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

1981 SAN DIEGO HYDROLOGY MANUAL RAINFALL INFORMATION USED

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE 0.90
RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
SPECIFIED CONSTANT RUNOFF COEFFICIENT 0.750
CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.
(BASED ON 07/1998 ADOPTED MANUAL)
NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT}	CROWN TO CROSSFALL (FT}	STREET-CROSSFALL: IN- / OUT-/PARK-	CURB HEIGHT (FT}	GUTTER-GEOMETRIES: WIDTH (FT)	LIP	HIKE	MANNING FACTOR (n}
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****
FLOW PROCESS FROM NODE 6000.00 TO NODE 6001.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======== ========== ======== ========== =
*OSER SPECIFIED(GLOBAL) :

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  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MINUTES ADDED     7.03(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =   170.00
  UPSTREAM ELEVATION =        573.50
  DOWNSTREAM ELEVATION =    558.40
  ELEVATION DIFFERENCE =     15.10
    10 YEAR RAINFALL INTENSITY(INCH/HOUR)    2.995
  SUBAREA RUNOFF(CFS)         0.90
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS)        0.90

********************** ********************************************************
  FLOW PROCESS FROM NODE    6001.00 TO NODE    6002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================= ==================== ========== ================  ==
  ELEVATION DATA: UPSTREAM(FEET) =    558.40   DOWNSTREAM(FEET)      552.35
  CHANNEL LENGTH THRO SUBAREA(FEET) =   750.00   CHANNEL SLOPE    0.0081
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.90
  FLOW VELOCITY(FEET/SEC) =   1.50   FLOW DEPTH(FEET) =   0.24
  TRAVEL TIME(MIN.) =   8.33   Tc(MIN.) =  15.37
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6002.00     920.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    6002,00 TO NODE    6002.00 IS CODE =  Bl

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========    ============================================================
    10 YEAR RAINFALL INTENSITY{INCH/HOUR) =  2.098
  *USER SPECIFIED(GLOBAL):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)      7.40   SUBAREA RUNOFF{CFS)     11.64
  TOTAL AREA(ACRES) =     7.80   TOTAL RUNOFF(CFS) =   12.54
  TC(MIN) =  15.37
=======  #.======================    ====================================
  END OF STUDY SUMMARY:
  TOT.AL .AREA(ACRES)     =      7.80  TC(MIN.) =     15.37
  PEAK FLOW RATE(CFS)   =     12.54
 -==============    ======================== c ========================
=====c==================c=========== ================================
  END OF RATIONAL METHOD ANALYSIS
```

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**************************************************************************.*     *

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                          Analysis prepared by:

                        Rick Engineering Company
                            5620 Friars Road
                          San Diego, CA  92110
                            (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
 * MCMILLIN OTRAY RANCH, VILLAGE 7                                        *
 * 100-YE.AR STORM EVENT TO SIZE BASIN 6000                               *
* J-14531A     JUNE 8, 2004        BY: AKW                                *
 **************************************** ****************************************

  FILE NAME: A:\100-6000.DAT
  TIME/DATE OF STUDY: 14:47 06/08/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY) DATA PAIRS =  9
   1)   5.000;  6.300
   2)  10.000;  4.000
   3)  15.000;  3.100
   4)  20.000;  2.600
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.600
   8)  50.000;  1.400
   9)  60.000;  1.300
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.750
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSS FALL:  CURB   GUTTER-GEOMETRIES:   MANNING
     WIDTH   CROSSFALL   IN- / OUT-/PARK-  HEIGHT WIDTH   LIP    HIKE   FACTOR
NO.   (FT)      (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT}  (FT)    (n}
           =========   =================   ======         ======        =====::=::=
  1   30.0     20.0    0.018/0.018/0.020    0.67    2.0b 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```

```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQOAL TO THE OPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    6000.00 TO NODE    6001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==================    ============================================================
  *USER SPECIFIED(GLOBAL):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =    0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MINUTES ADDED     7.03(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =   170.00
  UPSTREAM ELEVATION =        573.50
  DOWNSTREAM ELEVATION =    558.40
  ELEVATION DIFFERENCE =     15.10
   100 YEAR RAINFALL INTENSITY(INCH/HOUR)    5.364
  SUBAREA RUNOFF(CFS)         1.61
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS)        1.61

****************************************************** ******************
  FLOW PROCESS FROM NODE    6001.00 TO NODE    6002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRO SUBAREA (EXISTING ELEMENT)<<<<<
========================================   ============  ================ ========
  ELEVATION DATA: UPSTREAM(FEET) =    558.40  DOWNSTREAM(FEET)       552.35
  CHANNEL LENGTH THRO SUBAREA(FEET) =   750.00  CHANNEL SLOPE     0.0081
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.61
  FLOW VELOCITY(FEET/SEC) =   1.78   FLOW DEPTH(FEET) =   0.34
  TRAVEL TIME(MIN.) =   7.04   Tc(MIN.) =  14.08
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6002.00     920.00 FEET.

************************ ************************************************
  FLOW PROCESS FROM NODE    6002.00 TO NODE    6002.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================%==========================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.266
  *USER SPECIFIED(GLOBAL):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES)      7.40   SUBAREA RUNOFF(CFS)     18.13
  TOTAL AREA(ACRES) =     7.80   TOTAL RUNOFF(CFS) =   19.74
  TC(MIN) =  14.08
========================= = ========================================  ======
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)          7.80  TC(MIN.) =     14.08
  PEAK FLOW RATE(CFS)       19.74
================================================================================
== ===========|=======================  ============|====|= ================|==
  END OF RATIONAL METHOD ANALYSIS

1
```

Project McMillan Otay Ranch Village 7 Basin # 6000
Job # 14531A
Date 6/8/2004

NPDES Desiltiog Basin Calculations

Site Soecific Data

Basin	6000
Node	6002
Total Area (ac)	7.8
P_6 = P of a JO year, 6 hour event	1.7
C = Run-off Coefficient	0.75
D = Design Stonn Duration (min)	360
V_1 = Particle Settling Velocity	0.00024

Calculated Data

Q = CIA. (cfs) = Discharge Rate for Surface Area	1.66
A.= Min. Surface Area = l.2QNs (sf)	8305
A.= Min. Surface Area = l.2QNs (ac)	0.19
I= Intensity=?.44xP_6xD'^{45} (in/hr)	0.28
Required Width (ft)	65.0
ft	130.0

Assume the followin

Side Slope "Z"	2
Freeboard (ft)	2
Required Head (from Table 2)	1
Depth to Top of Riser (ft)	4
Silt Stora e De th ft	2

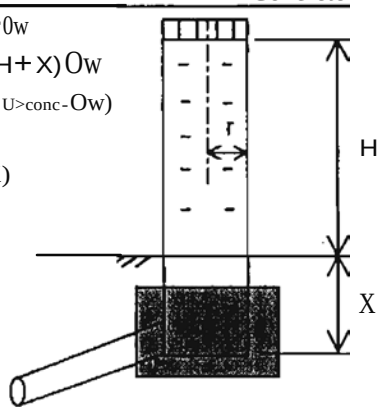
Dimensions of Basin	Calculated	Use
Width (ft)	65	65
Length (ft)	130	130
Depth (ft)		7

Basin Desien

Basin Depth (ft)	7.1	Basin Side Slopes	2:1
Basin Bottom Width (ft)	49	Basin Top Width (ft)	77.0
Basin Bottom Length (ft)	114	Basin Top Length (ft)	142.0
Basin Bottom Area (ft)	5,586	Basin Top Area (ft)	10,934
Top of Primary Riser (ft)	4	Top of Secondary Riser (ft)	*5*
Surface Area at Top of Riser (ft^2)	8,450	Primary Riser Diameter (in) '''	24
Silt Storage Volume (yd^3)	232.2	Secondary Riser Diameter (in) **	24

Concrete Anchor Desi o

=Ynser0w
$=m^2(H+X)Ow$
$f_{b\ mchor}$ = YconeU>conc-Ow)
Fbanchor 2: Fbriser
:VCOllc = 2.24r2(H+X)



Primary Riser Anchor

H = Height of Riser (ft)	4
X = Pipe Invert to Bottom of Basin (ft)	3.5
r = Radius of Riser (ft)	1
V_{cone} (cy)	0.29

Secondary Riser Anchor

H = Height of Riser (ft)	5.0
X = Pipe Invert to Bottom of Basin (ft)	3.5
r = Radius of Riser (ft)	
V_{conc} (cy)	0.29

* From Table 2 and 10-yr Rational Method for Mass Graded Condition (Q_{10}=12.54 cfs)
'''* From Table 2 and 100-yr Rational Method for Mass Graded Condition (Q_{100}= 19.74 cfs)

LEGEND

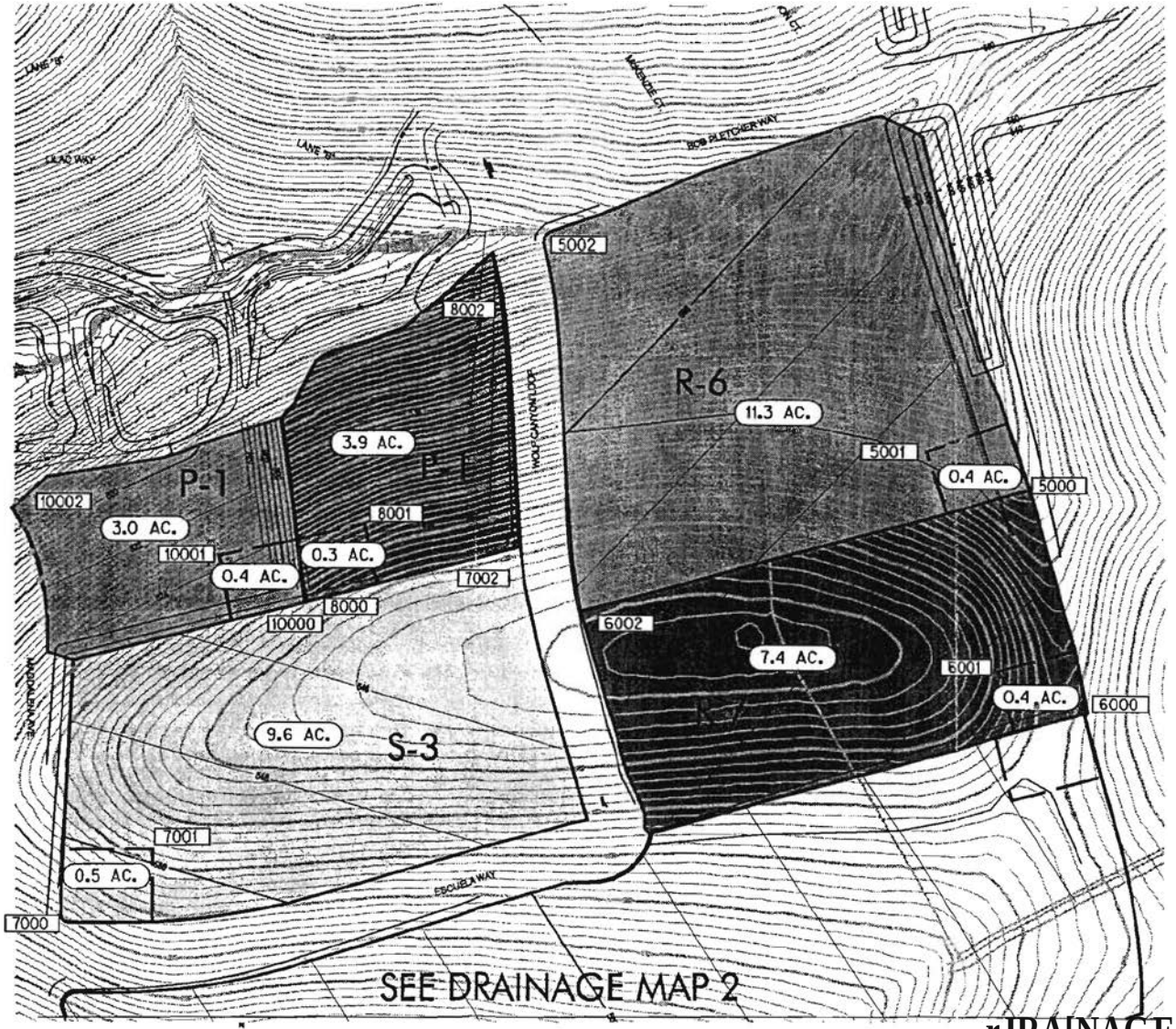
BASIN BOUNDARY

SUB-BASIN BOUNDARY

BASINS

(9.6 AC.) BASIN AREA (ACRES)

NODE NUMBER



200 100 0 200 400 600

GRAPHIC SCALE 1"= 200'

RICK ENGINEERING COMPANY CTI rOimlio• 1-mw 1·21

rJRA[NAGE MAP 1 FOR: ULTIMATE CONDITION McMILLIN OTAY RANCH VILLAGE 7

Basin 7000

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

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                          Analysis prepared by:

                         Rick Engineering Company
                             5620 Friars Road
                           San Diego, CA  92110
                             (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
* MCMILLIN OTAY RANCH, VILLAGE 7                                          *
* 10-YEAR STORM EVENT TO SIZE BASIN 7000                                  *
* J-14531A     JUNE 8, 2004    BY: AKW                                    *
 **************************************************************************

  FILE NAME: A:/7000.DAT
  TIME/DATE OF STUDY: 10:43 06/08/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  1981 SAN DIEGO HYDROLOGY MANUAL RAINFALL INFORMATION

  USED USER SPECIFIED STORM EVENT(YEAR) =    10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.850
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *OSER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL: CURB   GUTTER-GEOMETRIES:   MANNING
     WIDTH   CROSSFALL  IN-   / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.    (FT)     (FTJ    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
           =========   =================   ======  ======  ======        =======
  1   30.0     20.0    0.018/0.018/0.020    0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/SJ
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    7000.00 TO NODE    7001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============    ============================================================
  *USER SPECIFIED(GLOBAL):
```

```
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =  0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MINUTES ADDED     9.36(MINUTES)
 INITIAL SUBAREA FLOW-LENGTH =  200.00
 UPSTREAM ELEVATION =   551.40
 DOWNSTREAM ELEVATION =    550.25
 ELEVATION DIFFERENCE =     1.15
   10 YEAR RAINFALL INTENSITY(INCH/HOUR)   2.660
 SUBAREA RUNOFF(CFS)        1.13
 TOTAL AREA(ACRES) =     0.50   TOTAL RUNOFF(CFS)        1.13

****************************************************************************
 FLOW PROCESS FROM NODE   7001.00 TO NODE   7002.00 IS CODE    51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =    550.25  DOWNSTREAM(FEET)      542.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00   CHANNEL SLOPE    0.0088
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      1.13
 FLOW VELOCITY(FEET/SEC) =   1.65   FLOW DEPTH(FEET) =   0.27
 TRAVEL TIME(MIN.) =   8.59   Tc(MIN.) =  17.96
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7002.00    1050.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7002.00 TO NODE   7002.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.949
 *USER SPECIFIED(GLOBAL):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES)      9.60   SUBAREA RUNOFF(CFS)     15.90
 TOTAL AREA(ACRES) =    10.10   TOTAL RUNOFF(CFS) =   17.03
 TC(MIN) = 17.96
 ============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)          10.10  TC(MIN.) =     17.96
 PEAK FLOW RATE(CFS)   =     17.03
================================== ====================================
======= ===  C============================================================
 END OF RATIONAL METHOD ANALYSIS
```

1

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

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                              Analysis prepared by:

                            Rick Engineering Company
                                5620 Friars Road
                              San Diego, CA  92110
                                 (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
 * MCMILLIN OTAY RANCH, VILLAGE 7                                         *
 * 100-YEAR STORM EVENT TO SIZE BASIN 7000                                *
* J-14531A      JUNE B, 2004     BY: AKW                                   *
 *************************************************************************

  FILE NAME: A:\100-7000.DAT
  TIME/DATE OF STUDY: 14:53 06/08/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY  ADJUSTMENT  FACTOR  =  1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  6.300
   2)  10.000;  4.000
   3)  15.000;  3.100
   4)  20.000;  2.600
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.600
   B)  50.000;  1.400
   9)  60.000;  1.300
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.850
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL   IN- / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY     (FT)    (FT)  (FT)  (FT)    (n)

  1   30.0     20.0    0.018/0.018/0.020    0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```

```
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
    OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   7000.00 TO NODE   7001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC Ill =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MINUTES ADDED     9.36 (MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =   200.00
  UPSTREAM ELEVATION =    551.40
  DOWNSTREAM ELEVATION =    550.25
  ELEVATION DIFFERENCE =      1.15
     100 YEAR RAINFALL INTENSITY(INCH/HOUR)    4.292
  SUBAREA RUNOFF(CFS)        1.82
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS)        1.82

**********************************    ***************************************
  FLOW PROCESS FROM NODE   7001.00 TO NODE   7002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========  ==========c==========
  ELEVATION DATA: UPSTREAM(FEET) =    550.25 DOWNSTREAM(FEET)      542.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  850.00  CHANNEL SLOPE    0.0088
  CHANNEL BASE(FEET) =   2.00   "Z" FACTOR =  2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.82
  FLOW VELOCITY( FEET/SEC) =   1.90   FLOW DEPTH(FEET) =   0.35
  TRAVEL TIME(MIN.) =  7.44   Tc(MIN.) =  16.80
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7002.00    1050.00 FEET.

**************************************************** ********************
  FLOW PROCESS FROM NODE   7002.00 TO NODE   7002.00 IS CODE - 81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.920
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT c .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)      9.60  SUBAREA RUNOFF(CFS)      23.82
  TOTAL AREA(ACRES) =    10.10   TOTAL RUNOFF(CFS) =   25.65
  TC (MIN)  =  16.80
==========  ==========  ==ee==========  ==========  =  ========
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     10.10   TC(MIN.)=     16.80
  PEAK FLOW RATE(CFS)   =     25.65
==========  = =======  ====
   ==========  ==========  ==========  ==========  ==========  ==========
  END OF RATIONAL METHOD ANALYSIS
```

1

Project McMillan Otay Ranch Village 7 Basin # 7000
Job # 14531A
Date 6/8/2004

NPDES Desilting Basin Calculations

Site Specific Data

Basin	7000
Node	7002
Total Area (ac)	1cl.1
P, = P of a 10 year, 6 hour event	1.7
C = Run-off Coefficient	0.85
D = Design Storm Duration {min)	360
V, = Particle Settling Velocity	0.00024

Calculated Data

Q = CU. (cfs) = Discharge Rate for Surface Area	2.44
A.= Min. Surface Area = l.2QNs (sf)	12188
A.= Min. Surface Area = 1.2QNs (ac)	0.28
I = Intensity=$7.44xP_6 xD^{-.45}$ (in/hr)	0.28
Required Width (ft)	79.0
ft	158.0

Assume the followin

Side Slope "Z"	2
Freeboard (ft)	2
Required Head (from Table 2)	0.8
Depth to Top of Riser (ft)	4
Silt Stora e De th ft	2

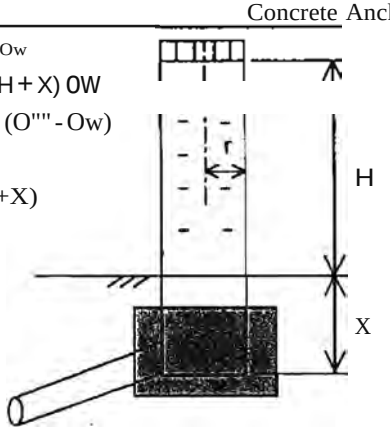
Dimensions of Basin	Calculated	Use
Width (ft)	79	80
Length (ft)	158	160
Deoth (ft)	•	6.8

Basin Desi n

Basin Depth (ft)	6.8	Basin Side Slopes	2:1
Basin Bottom Width (ft)	64	Basin Top Width (ft)	91.2
Basin Bottom Length (ft)	144	Basin Top Length (ft)	171.2
Basin Bottom Area (ft)	9,216	Basin Top Area (ft)	15,613
Top of Primary Riser (ft)	4	Top of Secondary Riser (ft)	4.8
Surface Area at Top of Riser (ft2)	12,800	Primary Riser Diameter (in) •	30
Silt Stora e Volume d^3	373.3	Secon Riser Diameter in °	24

Concrete Anchor Desi n

= Vnser Ow
= :rcr^2(H + X) 0W
Fb anchor = Vcouc (O"" - Ow)
Fb anchor :'.'.:: Fb riser
--- VCOIIC = 2.24r2(H+X)



Primary Riser Anchor

H Height of Riser (ft)	4
X = Pipe Invert to Bottom of Basin (ft)	3.5
r = Radius of Riser (ft)	1.25
Vconc (cy)	0.45

Secondazy Riser Anchor

H = Height of Riser (ft)	4.8
X = Pipe Invert to Bottom of Basin (ft)	3.5
r = Radius of Riser (ft)	
Vconc (cy)	0.29

• From Table 2 and 10-yr Rational Method for Mass Graded Condition (Q_{10}=17.03 cfs)
•• From Table 2 and 100-yr Rational Method for Mass Graded Condition (Q_{100}- 25.65 cfs)

LEGEND

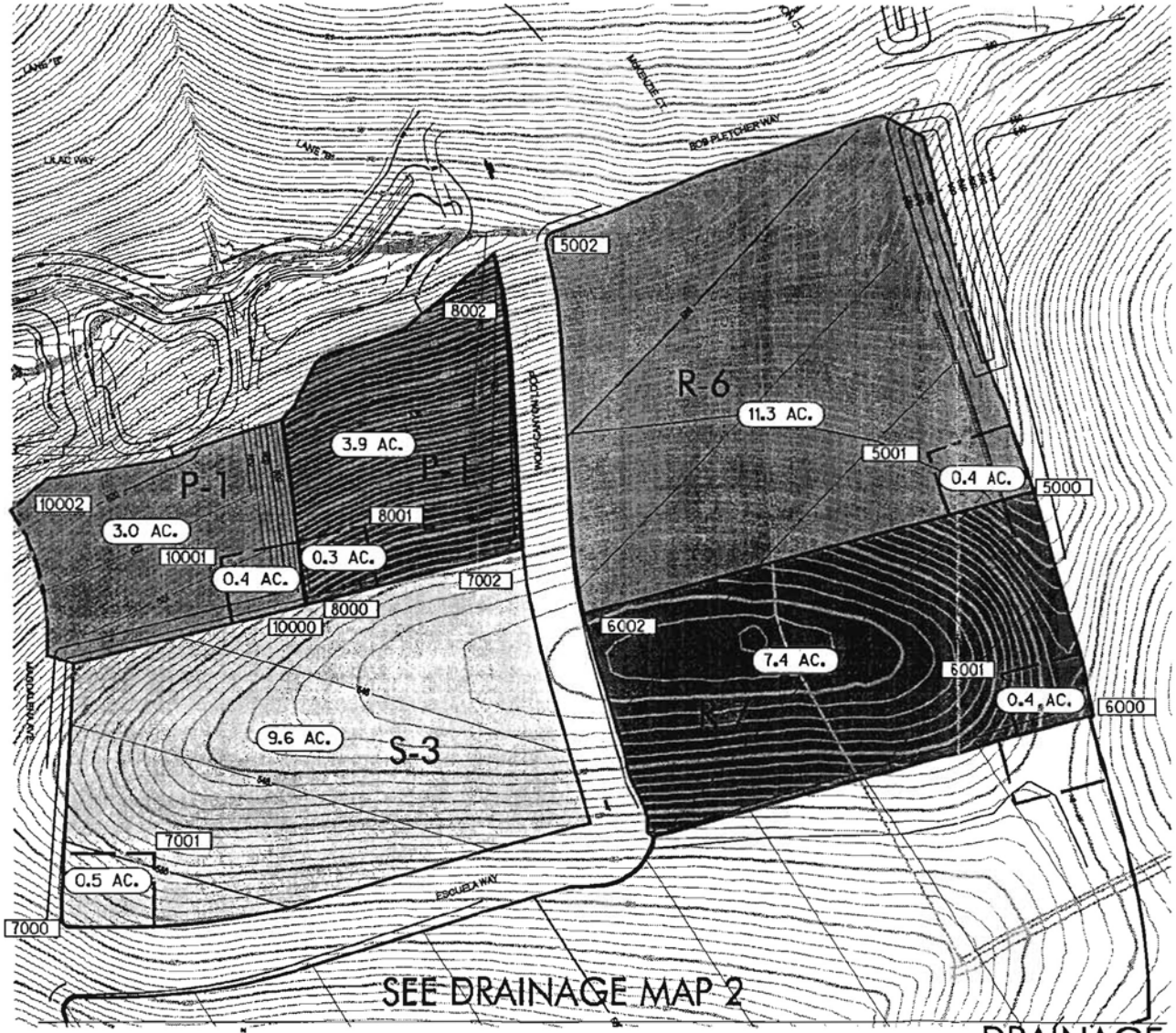
BASIN BOUNDARY

SUB-BASIN BOUNDARY

BASINS

(9.6 AC.) BASIN AREA (ACRES)

[]QQD NODE NUMBER



200 100 0 200 400 600

GRAPHIC SCALE 1"= 200'

DRAINAGE MAP 1 FOR: ULTIMATE CONDITION McMILLIN OTAY RANCH VILLAGE 7

Basin 8000

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

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                          Analysis prepared by:

                        Rick Engineering Company
                            5620 Friars Road
                          San Diego, CA  92110
                            (619)291-0707

 ************************** DESCRIPTION OF STUDY **************************
*'MCMILLIN OTAY RANCH, VILLAGE 7                                           *
* 10-YEAR STORM EVENT TO SIZE BASIN 8000                                   *
* J-14531A     JUNE 8, 2004   BY: AKW                                      *
 ****************************************************************************

  FILE NAME: A:/8000.DAT
  TIME/DATE OF STUDY: 11:12 06/08/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  1981 SAN DIEGO HYDROLOGY MANUAL RAINFALL INFORMATION

  USED USER SPECIFIED STORM EVENT(YEAR) =    10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.650
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO    STREET-CROSSFALL: CURB   GUTTER-GEOMETRIES:    MANNING
     WIDTH   CROSSFALL   IN-  / OUT- /PARK-  HEIGHT WIDTH   LIP    HIKE   FACTOR
NO.    (FT)      (FT)     SIDE / SIDE/ WAY     (fT)    (FT)  (FT)   (FT)    (n)
           =========   ===========   ===  ======        ======
  1   30.0     20.0    0.018/0.018/0.020   0.67     2.00 0.0313  0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************** ***.***************
  FLOW PROCESS FROM NODE    8000.00 TO NODE    8001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================c========== ==============================
  *USER SPECIFIED(GLOBAL):
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 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =  0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MINUTES ADDED     7.40 (MINUTES)
 INITIAL SUBAREA FLOW-LENGTH =  180.00
 UPSTREAM ELEVATION =    546.00
 DOWNSTREAM ELEVATION =   537.80
 ELEVATION DIFFERENCE =     8.20
   10 YEAR RAINFALL INTENSITY (INCH/HOUR)   2.940
 SUBAREA RUNOFF(CFS)       0.57
 TOTAL AREA(ACRES) =     0.30   TOTAL RUNOFF(CFS)       0.57

****************************************************************************
 FLOW PROCESS FROM NODE   9001.00 TO NODE   8002.00 IS CODE =  51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   537.80  DOWNSTREAM(FEET)      536.00
 CHANNEL LENGTH THRO SUBAREA(FEET) =  540.00   CHANNEL SLOPE    0.0033
 CHANNEL BASE (FEET) =    2.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      0.57
 FLOW VELOCITY(FEET/SEC) =   0.96   FLOW DEPTH(FEET) =   0.24
 TRAVEL TIME(MIN.) =   9.40   Tc(MIN.) =  16.80
 LONGEST FLOWPATH FROM NODE   8000.00 TO        8002.00     720.00 FEET.
 NODE

****************************************************************************
 FLOW PROCESS FROM NODE   9002.00 TO NODE   8002.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   10 YEAR RAINFALL INTENSITY (INCH/HOUR) =  2.012
  *USER SPECIFIED(GLOBAL):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES) =    3.90   SUBAREA RUNOFF(CFS)      5.10
 TOTAL AREA(ACRES) =     4.20   TOTAL RUNOFF(CFS) =    5.67
 TC (MIN) =  16.80

 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)          4.20  TC(MIN.) =     16.80
 PEAK FLOW RATE(CFS)  =     5.67
==============================c=====  ================================  ;=

 END OF RATIONAL METHOD ANALYSIS
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1

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

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            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         1985,1981 HYDROLOGY MANUAL
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              Ver. l.SA Release Date: 01/01/2000  License ID 1261

                            Analysis prepared by:

                          Rick Engineering Company
                              5620 Friars Road
                            San Diego, CA  92110
                              (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
* MCMILLIN OTAY RANCH, VILLAGE 7                                          *
* 100-YEAR STORM EVENT TO SIZE BASIN 8000                                 *
* J-14531A    JUNE B, 2004   BY: .AKW                                     *
 ***************** ***************************  ***** ********** *********

  FILE NAME: A:\100-8000.DAT
  TIME/DATE OF STUDY: 15:01 06/08/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  6.300
   2)  10.000;  4.000
   3)  15.000;  3.100
   4)  20.000;  2.600
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.600
   8)  50.000;  1.400
   9)  60.000;  1.300
  SPECIFIED CONSTANT RUNOFF COEFFICIENT =, 0.650
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN  TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH   CROSSFALL  IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)     SIDE / SIDE/ WAY     (FT)    (FT)  (FT)   (FT)    (n)
          =========  =<=============• m=====
  1  30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```

*SIZE PIPE WITH A FLO'V'l CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****

FLOW PROCESS FROM NODE 8000.00 TO NODE 8001.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

*USER SPECIFIED(GLOBAL):
RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
ORBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
TIME OF CONCENTRATION WITH 6-MINUTES ADDED 7.40(MINUTES)
INITIAL SUBAREA FLOW-LENGTH = 180.00
UPSTREAM ELEVATION = 546.00
DOWNSTREAM ELEVATION = 537.80
ELEVATION DIFFERENCE = 8.20
100 YEAR RAINFALL INTENSITY(INCH/HOUR) 5.197
SUBAREA RUNOFF(CFS) 1.01
TOTAL AREA(ACRES) = 0.30 TOTAL RUNOFF(CFS) L O1

****

FLOW PROCESS FROM NODE 8001.00 TO NODE 8002.00 IS CODE = 51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 537.80 DOWNSTREAM(FEET) 536.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 540.00 CHANNEL SLOPE 0.0033
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 1.01
FLOW VELOCITY(FEET/SEC) = 1.14 FLOW DEPTH(FEET) = 0.33
TRAVEL TIME(MIN.) = 7.88 Tc(MIN.) = 15.28
LONGEST FLOWPATH FROM NODE 8000.00 TO NODE 8002.00 720.00 FEET.

****

FLOW PROCESS FROM NODE 8002.00 TO NODE 8002.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.072
*USER SPECIFIED(GLOBAL):
RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
SUBAREA AREA(ACRES) 3.90 SUBAREA RUNOFF(CFS) 7.79
TOTAL AREA(ACRES} = 4.20 TOTAL RUNOFF(CFS) 8.80
TC(MIN) = 15.28

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) 4.20 TC(MIN.) = 15.28
PEAK FLOW RATE (CFS) = 8.80

END OF RATIONAL METHOD ANALYSIS

1

Project McMillan Otay Ranch Village 7 Basin # 8000
Job # 14531A
Date 6/8/2004

NPDES Desilting Basin Calculations

Site Soecific Data

Basin	8000
Node	8002
Total Area (ac)	4.2
P_6 – P of a 10 year, 6 hour event	1.7
C = Run-off Coefficient	0.65
D = Design Storm Duration (min)	360
V,= Particle Settling Velocity	0.00024

Calculated Data

Q = CIA, (cfs) = Discharge Rate for Surface Area	0.78
A, = Min. Surface Area = l.2QNs (sf)	3876
A, = Min. Surface Area = l.2QNs (ac)	0.09
I = Intensit)=7.44xP_6xD$^{-0.64}$\in/hr)	0.28
Required Width (ft)	45.0
Required Length (ft	90.0

Assume the followin

Side Slope "'l}	2
Freeboard (ft)	2
Required Head (from Table 2)	0.5
Depth to Top of Riser (ft)	4
Silt Stora e D th ft	2

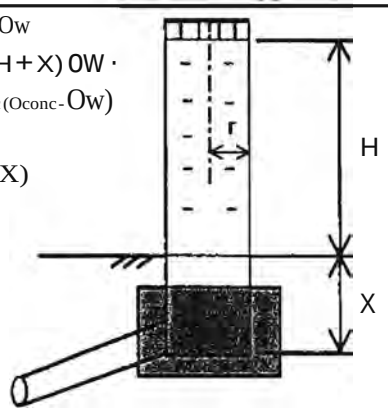
Dimensions of Basin	Calculated	Use
Width (ft)	45	45
Length (ft)	90	90
Depth (ft)		6.5

Basin Desi1rn

Basin Depth (ft)	6.5	Basin Side Slopes	2:1
Basin Bottom Width (ft)	29	Basin Top Width (ft)	55.0
Basin Bottom Length (ft)	74	Basin Top Length (ft)	100.0
Basin Bottom Area (ft)	2,146	Basin Top Area {ft)	5,500
Top of Primary Riser (ft)	4	Top of Secondary Riser (ft)	4.5
Surface Area at Top of Riser (ft^2)	4,050	Primary Riser Diameter (in) *	24
Silt Storage Volume (yd^3)	*95.9*	Secondary Riser Diameter (in) **	24

Concrete Anchor Desi o

$F_{b\ riser}$ = vrtu:r Ow
= itr ^{2}(H + X) OW ·
$F_{b\ anchor}$ = Vcoac (Oconc - Ow)
$F_{b\ anchor}$ $F_{b\ riscr}$
: $V_{cone} = 2.24r^2(H+X)$



Primary Riser Anchor

H= Height of Riser (ft)	4
X = Pipe Invert to Bottom of Basin (ft)	3
r = Radius of Riser (ft)	1
vconc (cy)	0.25

Secondary Riser Anchor

H = Height of Riser (ft)	4.5
X = Pipe Invert to Bottom of Basin (ft)	3
r = Radius of Riser (ft)	I
Vconc (cy)	0.25

• From Table 2 and 10-yr Rational Method for Mass Graded Condition (Q_{10}=5.67 cfs)
** From Table 2 and 100-yr Rational Method for Mass Graded Condition (Q_{100}= 8.80 cfs)

LEGEND

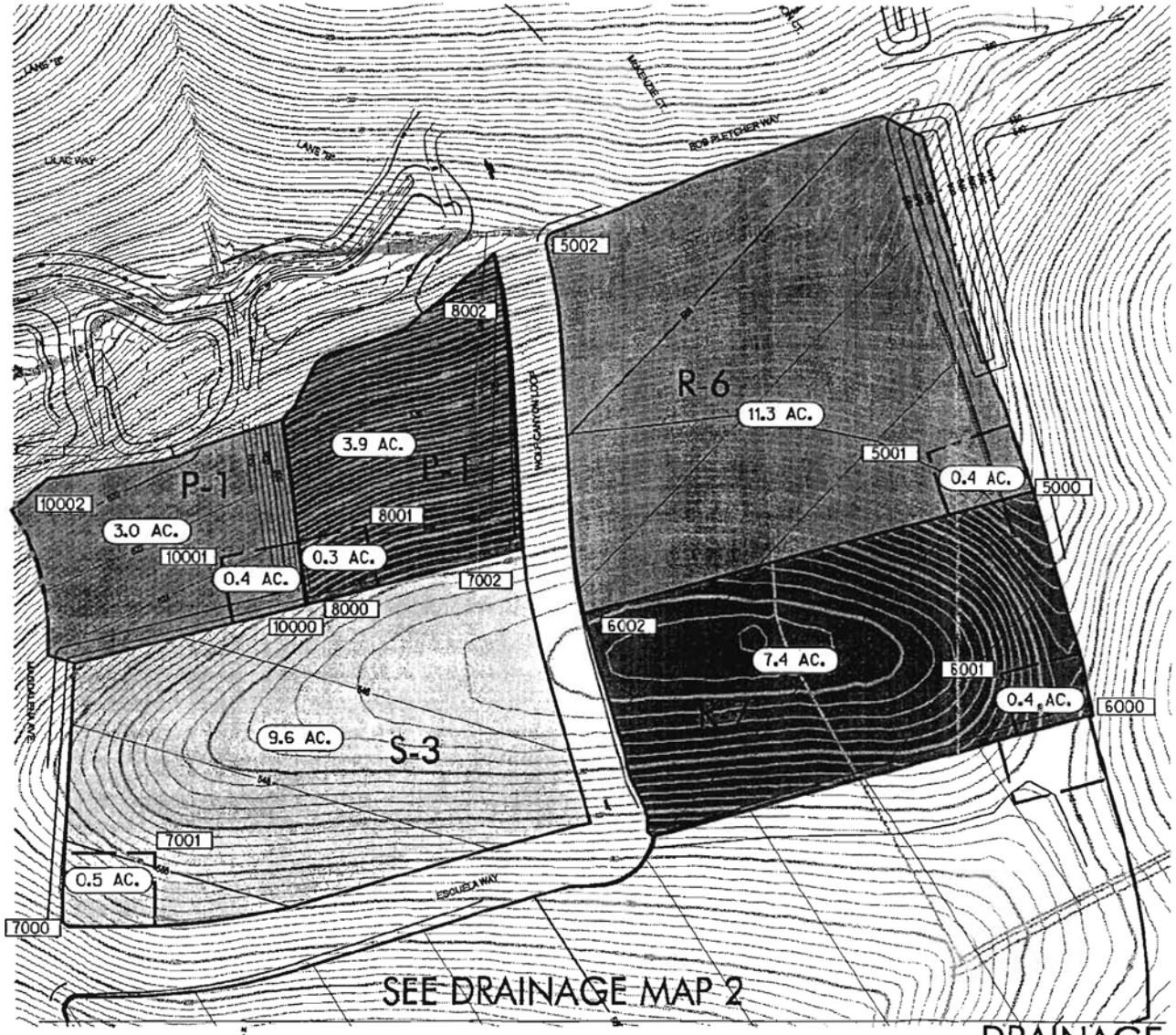
BASIN BOUNDARY

SUB-BASIN BOUNDARY

BASINS

(9.6 AC.) BASIN AREA (ACRES)

[@] NODE NUMBER



200 100 0 200 400 600

GRAPHIC SCALE 1" = 200'

DRAINAGE MAP 1 FOR: ULTIMATE CONDITION McMILLIN OTAY RANCH VILLAGE 7

Basin 9000

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

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                                Analysis prepared by:

                              Rick Engineering Company
                                  5620 Friars Road
                                San Diego, CA  92110
                                  (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
* MCMILLIN·OTAY RANCH, VILLAGE 7                                          *
* 10-YEAR STORM EVENT TO SIZE BASIN 9000                                  *
* J-14531A     JUNE 8, 2004     BY: AKW                                   *
 ************************************************************************  *******

  FILE NAME: A:/9000.DAT
  TIME/DATE OF STUDY: 11:17 06/08/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  1981 SAN DIEGO HYDROLOGY MANUAL RAINFALL INFORMATION

  USED USER SPECIFIED STORM EVENT(YEAR) =    10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE    0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.850
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   {BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL: CURB   GUTTER-GEOMETRIES:   MANNING
     WIDTH   CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.   (FT)      (FT)     SIDE / SIDE/ WAY    (FT)    (FT)   (FT)  (FT)    (n)
           ====:::====  ================   =======       ======        ==.C:====
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity} Constraint =  6.0 (FT*FT/S}
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    9000.00 TO NODE    9001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=======[=======[========[=[========[==[=======[=   ====[=[=[====[=====[===
  *USER SPECIFIED(GLOBAL) :
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 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =  0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
 TIME OF CONCENTRATION WITH  6-MINUTES ADDED     7.3l(MINUTES)
 INITIAL SUBAREA FLOW-LENGTH =  210.00
 UPSTREAM ELEVATION =  573.50
 DOWNSTREAM ELEVATION =  558.00
 ELEVATION DIFFERENCE =  15.50
   10 YEAR RAINFALL INTENSITY(INCH/HOUR)  2.954
 SUBAREA RUNOFF(CFS)  1.00
 TOTAL AREA(ACRES) =  0.40  TOTAL RUNOFF(CFS)  1.00

****************************************************************************
 FLOW PROCESS FROM NODE  9001.00 TO NODE  9002.00 IS CODE =  51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =  558.00  DOWNSTREAM(FEET)  550.82
 CHANNEL LENGTH THRO SUBAREA(FEET) =  1730.00  CHANNEL SLOPE =  0.0042
 CHANNEL BASE(FEET) =  2.00  "Z" FACTOR =  2.000
 MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(FEET) =  2.00
 CHANNEL FLOW THRO SUBAREA(CFS) =  1.00
 FLOW VELOCITY(FEET/SEC) =  1.24  FLOW DEPTH(FEET) =  0.31
 TRAVEL TIME(MIN.) =  23.31  Tc(MIN.) =  30.62
 LONGEST FLOWPATH FROM NODE  9000.00 TO NODE  9002.00  1940.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  9002.00 TO NODE  9002.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====  ================================  =======  ============================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.446
 *USER SPECIFIED(GLOBAL):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =  0
 SUBAREA AREA(ACRES)  52.10  SUBAREA RUNOFF(CFS)  64.05
 TOTAL AREA(ACRES) =  52.50  TOTAL RUNOFF(CFS) =  65.06
 TC(MIN) =  30.62

 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)  =  52.50  TC(MIN.) =  30.62
 PEAK FLOW RATE(CFS)  =  65.06
==========================  ========== ==========================  ==========
==  ================================================C  ==========================
 END OF RATIONAL METHOD ANALYSIS
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1

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

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                          Analysis prepared by:

                         Rick Engineering Company
                             5620 Friars Road
                           San Diego, CA  92110
                              (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
* MCMILLIN OTAY RANCH, VILLAGE 7                                          *
* 100-YEAR STORM EVENT TO SIZE BASIN 9000                                 *
* J-14531A     JUNE B, 2004    BY: AKW                                    *
 **************************************************************************

  FILE NAME: A:\100-9000.DAT
  TIME/DATE OF STUDY: 15:04 06/08/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR   1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  6.300
   2)  10.000;  4.000
   3)  15.000;  3.100
   4)  20.000;  2.600
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.600
   8)  50.000;  1.400
   9)  60.000;  1.300
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.850
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION  MODEL  SELECTED. *
   (BASED ON  07/1998  ADOPTED  MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN  TO   STREET-CROSSFALL:  CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY     (FT)    (FT)  (FT)  (FT)    (n)

  1   30.0     20.0    0.018/0.018/0 .020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = 0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```

```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

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

  FLOW PROCESS FROM NODE    9000.00 TO NODE    9001.00 IS CODE =   21

  »»>RATIONAL METHOD INITIAL SUBAREA ANALYSIS«««
==================== ================================== ============ ====
  *USER SPECIFIED(GLOBAL):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =    0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A)
  TIME OF CONCENTRATION WITH  6-MINUTES ADDED     7.31(MINUTES)
  INITIAL SOBAREA FLOW-LENGTH =    210.00
  UPSTREAM ELEVATION =     573.50
  DOWNSTREAM ELEVATION =     558.00
  ELEVATION DIFFERENCE =      15.50
     100 YEAR RAINFALL INTENSITY(INCH/HOUR)     5.238
  SUBAREA RUNOFF(CFS)         1.78
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS)         1.78

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

  FLOW PROCESS FROM NODE    9001.00 TO NODE    9002.00 IS CODE =   51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================== ============ ============================ ===============
  ELEVATION DATA: UPSTREAM(FEET) =     558.00  DOWNSTREAM(FEET)       550.82
  CHANNEL LENGTH THRO SUBAREA(FEET) =  1730.00   CHANNEL SLOPE     0.0042
  CHANNEL BASE (FEET} =     2.00    "Z" FACTOR =    2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =    2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.78
  FLOW VELOCITY (FEET/SEC) =    1.47   FLOW DEPTH (FEET) =    0.42
  TRAVEL TIME(MIN.) =  19.57   Tc(MIN.} =  26.88
  LONGEST FLOWPATH FROM NODE    9000.00 TO NODE    9002.00    1940.00 FEET.

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

  FLOW PROCESS FROM NODE    9002.00 TO NODE    9002.00 IS CODE =   81

  >>>>>ADDITION OF SOBAREA TO MAINLINE PEAK FLOW<<<<<
================== ================ ========== ====================== ======
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.125
  *USER SPECIFIED(GLOBAL}:
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II} =    0
  SUBAREA AREA(ACRES)    52.10    SUBAREA RUNOFF(CFS}     94.10
  TOTAL AREA(ACRES) =    52.50   TOTAL RUNOFF(CFS) =    95.88
  TC(MIN) =  26.88
========================= z ============================= = ===============
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)          52.50  TC(MIN.) =     26.88
  PEAK FLOW RATE(CFS)  =     95.88
 ======= ================   ==========================================
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  END OF RATIONAL METHOD ANALYSIS

 1
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Project McMillan Qtay Ranch Village 7 Basin # 9000
Job # 14531A
Date 6/8/2004

NPDES Desilting Basin Calculations

Site Specific Data

Basin	9000
Node	9002
Total Area (ac)	52.5
P_6 = P of a 10 year, 6 hour event	1.7
C = Run-off Coefficient	0.85
D = Design Storm Duration (min)	360
V, = Particle Settling Velocity	0.00024

Calculated Data

Q = CI" (cfs) = Discharge Rate for Surfac Area	12.67
"= Min . Surface Area = 1.2QNs (sf)	63351
"= Min. Surface Area = 1.2QN s (ac)	1.45
I = Intensity=7.44xP_6xD.oAs(in/hr)	0.28
Required Width (ft)	178.0
Re uired Len ft	356.0

Assume the followin

Side Slope "Z"	2
Freeboard (ft)	2
Required Head (from Table 2)	
Depth to Top of Riser (ft)	4
Silt Stora e D th ft	2

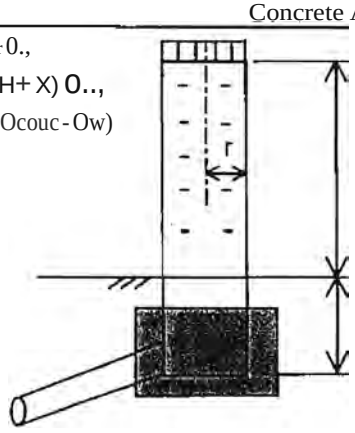
Dimensions of Basin	Calculated	Use
Width (ft)	178	180
Length (ft)	356	360
Deoth (ft)		7

Basin Desi n

Basin Depth (ft)	7.0	Basin Side Slopes	2:1
Basin Bottom Width (ft)	164	Basin Top Width (ft)	192.0
Basin Bottom Length (ft)	344	Basin Top Length (ft)	372.0
Basin Bottom Area (ft)	56,416	Basin Top Area (ft)	71,424
Top of Primary Riser (ft)	4	Top of Secondary Riser (ft)	5.0
Surface Area at Top of Riser (ft^2)	64,800	Primary Riser Diameter (in) *	66
Silt Stora e Volume yd^3	2,165.9	Secon Riser Diameter in	42

Concrete Anchor Des" n

= Vriser 0.,
= m^2(H+ X) 0..,
Fb anchor = Vconc (Ocouc - Ow)
Fb anchor fb riser
•• Vcone = 2.24r^2 H+X)(



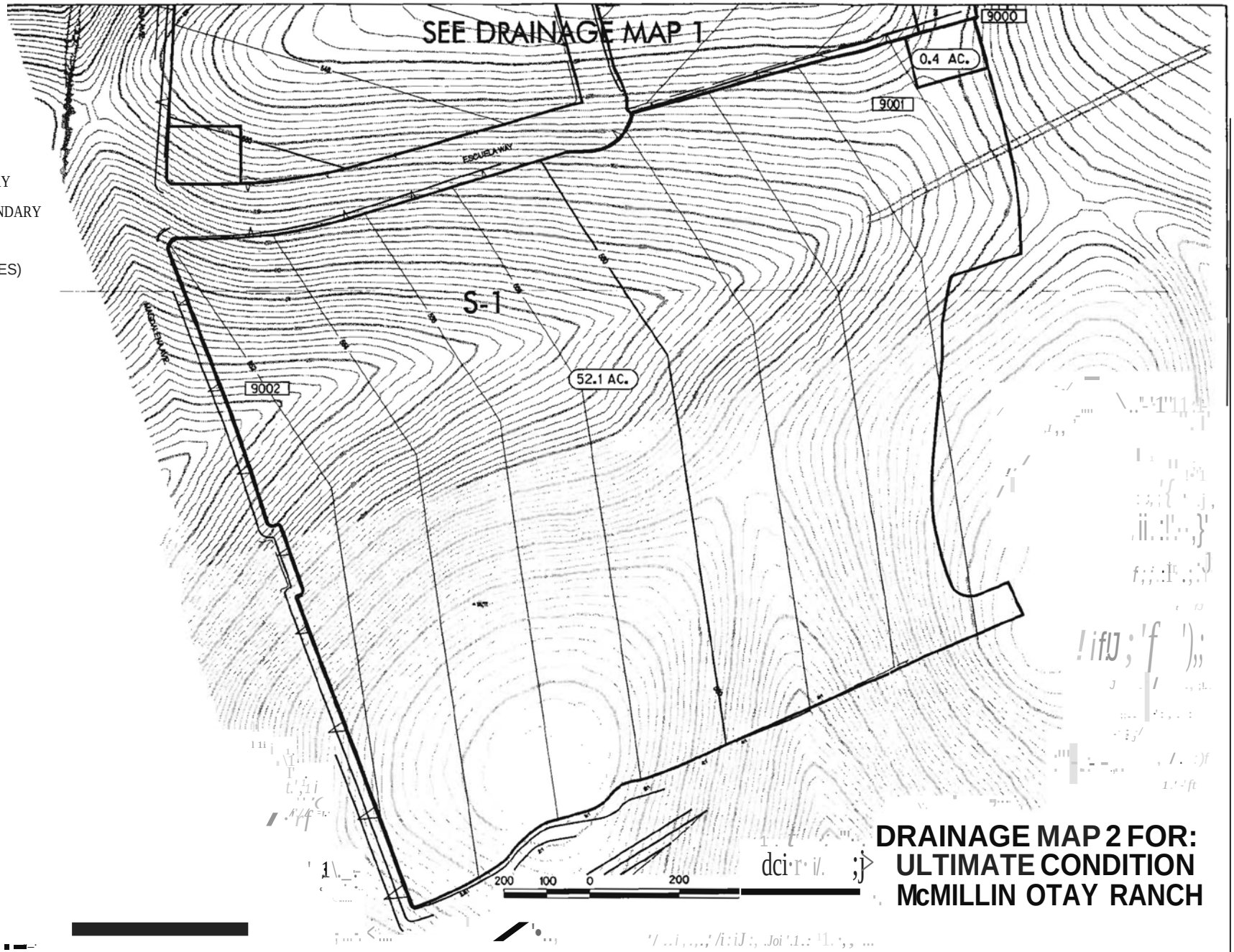
Primary Riser Anchor

H = Height of Riser (ft)	4
X = Pipe Invert to Bottom of Basin (ft)	5
r = Radius of Riser (ft)	2.75
V_{CODC} (cy)	3.14

Secondary Riser Anchor

H= Height of Riser (ft)	5
X = Pipe Invert to Bottom of Basin (ft)	5
r = Radius of Riser (ft)	1.75
vconc (cy)	1.27

• From Table 2 and 10-yr Rational Method for Mass Graded Condition (Q_{10}=65.06 cfs)
•• From Table 2 and 100-yr Rational Method for Mass Graded Condition (Q_{100}= 95.88 cfs)



LEGEND

- BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- BASINS
- (9.6 AC.) BASIN *ARIA* (ACRES)
- NODE NUMBER

DRAINAGE MAP 2 FOR: ULTIMATE CONDITION McMILLIN OTAY RANCH

RicKENG!NEERJNG CCMB-'NY

GRAPHIC SCALE 1'= 200'

VILLAGE 7

Basin 10000

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2000 Advanced Engineering Software (aes)
              Ver. l.SA Release Date: 01/01/2000  License ID 1261

                           Analysis prepared by:

                          Rick Engineering Company
                              5620 Friars Road
                            San Diego, CA  92110
                              (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
 * MCMILLIN OTAY RANCH, VILLAGE 7                                         *
 * 10-YEAR STORM EVENT TO SIZE BASIN 10000                                *
* J-14531A    JUNE 8, 2004    BY: AKW                                     *
 **************************************************************************

  FILE NAME: A:/10000.DAT
  TIME/DATE OF STUDY: 11:21 06/08/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  1981 SAN DIEGO HYDROLOGY MANUAL RAINFALL INFORMATION USED

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.650
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL: CURB   GUTTER-GEOMETRIES:    MANNING
     WIDTH   CROSSFALL   IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP    HIKE   FACTOR
NO.    (FT)      {FT)    . SIDE / SIDE/ WAY     (FT)     {FT)  (FT)   (FT)    (n)
  1   30.0      20.0     0.018/0.018/0.020    0.67     2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE  10000.00 TO NODE  10001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==================c==== ====================== ====================
  *USER SPECIFIED(GLOBAL):
```

```
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =  0
 URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A}
 TIME OF CONCENTRATION WITH 6-MINUTES ADDED     6.89 (MINUTES)
 INITIAL SUBAREA FLOW-LENGTH =  170.00
 UPSTREAM ELEVATION =   546.00
 DOWNSTREAM ELEVATION =  523.54
 ELEVATION DIFFERENCE =   22.46
   10 YEAR RAINFALL INTENSITY(INCH/HOUR)   3.018
 SUBAREA RUNOFF(CFS)       0.78
 TOTAL AREA(ACRES) =     0.40   TOTAL RUNOFF(CFS)       0.78

****************************************************************************
 FLOW PROCESS FROM NODE  10001.00 TO NODE  10002.00 IS CODE =  51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =    523.54  DOWNSTREAM(FEET)      518.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   380.00   CHANNEL SLOPE    0.0146
 CHANNEL BASE(FEET} =    2.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      0.78
 FLOW VELOCITY(FEET/SEC) =   1.76   FLOW DEPTH(FEET) =   0.19
 TRAVEL TIME(MIN.) =   3.60   Tc(MIN.) =  10.49
 LONGEST FLOWPATH FROM NODE  10000.00 TO NODE  10002.00     550.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.00 TO NODE  10002.00 IS CODE =  Bl

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.536
  *USER SPECIFIED(GLOBAL):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES)      3.00   SUBAREA RUNOFF(CFS)      4.95
 TOTAL AREA(ACRES) =     3.40   TOTAL RUNOFF(CFS) =    5.73
 TC(MIN) =  10.49
===== == ============================================    === ======
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =      3.40  TC(MIN.) =     10.49
 PEAK FLOW RATE(CFS)    =      5.73
============================================================================
============ ======================== ===================================
 END OF RATIONAL METHOD ANALYSIS

1
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**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2000 Advanced Engineering Software (aes)
              Ver. l.5A Release Date: 01/01/2000  License ID 1261

                            Analysis prepared by:

                          Rick Engineering Company
                              5620 Friars Road
                            San Diego, CA  92110
                              (619) 291-0707

 ************************** DESCRIPTION OF STUDY **************************
* MCMILLIN OTAY RANCH- VILLAGE 7                                          *
* 100-YEAR STORM EVENT TO SIZE BASIN 10000                                *
* J-14531A     6/8/2004     BY: AKW                                       *
 **************************************************************************

  FILE NAME: A:\10010000.DAT
  TIME/DATE OF STUDY: 15:14 06/08/2004

  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE   0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  6.300
   2)  10.000;  4.000
   3)  15.000;  3.100
   4)  20.000;  2.600
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.600
   8)  50.000;  1.400
   9)  60.000;  1.300
  SPECIFIED CONSTANT RUNOFF COEFFICIENT = 0.650
  *CITY OF CHULA VISTA TIME-OF-CONCENTRATION MODEL SELECTED.*
   (BASED ON 07/1998 ADOPTED MANUAL)
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:  CUR,B  GUTTER-GEOMETRIE S:  MANNING
     WIDTH   CROSSFALL  IN- / OUT-/PARK-   HEIGHT WIDTH   LIP   HIKE   FACTOR
NO.   (FT)      (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
     ========  ========  ================  ======  ------ ======  ========
   1   30.0      20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```

```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE  10000.00 TO NODE  10001.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=======d=======  ============================================================
  *USER SPECIFIED(GLOBAL):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II} =   0
  URBAN AREA WATERSHED (USED NATURAL WATERSHED NOMOGRAPH, APPENDIX X-A}
  TIME OF CONCENTRATION WITH  6-MINUTES ADDED     6.89(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH =   170.00
  UPSTREAM ELEVATION =    546.00
  DOWNSTREAM ELEVATION =    523.54
  ELEVATION DIFFERENCE =   22.46
   100 YEAR RAINFALL INTENSITY(INCH/HOUR}    5.431
  SUBAREA RUNOFF(CFS)        1.41
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS)        1.41

****************************************************************************
  FLOW PROCESS FROM NODE  10001.00 TO NODE  10002.00 IS CODE =  51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================  ==========================
(                                                                          |
\ ELEVATION DATA: UPSTREAM(FEET) =    523.54  DOWNSTREAM(FEET)       518.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   380.00   CHANNEL SLOPE    0.0146
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.41
  FLOW VELOCITY(FEET/SEC) =   2.11   FLOW DEPTH(FEET) =   0.26
  TRAVEL TIME(MIN.)     3.00   Tc(MIN.) =   9.88
  LONGEST FLOWPATH FROM NODE  10000.00 TO NODE  10002.00     550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  10002.00 TO NODE  10002.00 IS CODE =  81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================= ==========================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.054
  *USER SPECIFIED(GLOBAL):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES)      3.00   SUBAREA RUNOFF(CFS)      7.90
  TOTAL AREA(ACRES) =     3.40   TOTAL RUNOFF(CFS) =    9.32
  TC(MIN) ""'  9.88
=========================================================    ==============
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)          3.40  TC(MIN.) =      9.88
  PEAK FLOW RATE(CFS)    =      9.32
 ================== ================== =========== ==================
============================-=== ==================  =================  ==
  END OF RATIONAL METHOD ANALYSIS

 1
```

Project McMillan Otay Ranch Village 7 Basin # 10000
Job # 14531A
Date 6/812004

NPDES Desilting Basin Calculations

Site Specific Data

Basin	10000
Node	10002
Total Area (ac)	3.4
P, = P of a 10 year, 6 hour event	1.7
C = Run-off Coefficient	0.85
D = Design Storm Duration (min)	360
V,= Particle Settling Velocity	0.00024

Calculated Data

Q = CIA, (cfs)
== Discharge Rate for Surface Area

As = Min. Surface Area = *l.2QNs* (sf)	4103	
As = Min. Surface Area = 1.2QNs (ac)		0.09
I = Intensity = $7.44xP_6xD^{-6}$ (in/hr)	0.28	
Required Width (ft)	46.0	
Required Length (ft) .	92.0	

0.8

Assume the followin

Side Slope "Z"	2
Freeboard (ft)	2
Required Head (from Table 2)	0.5
Depth to Top of Riser (ft)	4
Silt Stora e D th (ft	2

Dimensions of Basin

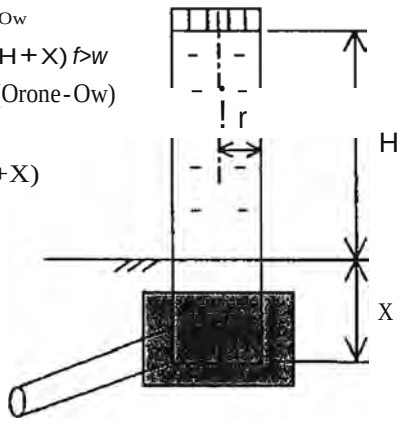
	Calculated	Use
Width (ft)	46	50
Length (ft)	92	100
Depth (ft)		6.5

Basin Desi n

Basin Depth (ft)	6.5	Basin Side Slopes	2:1
Basin Bottom Width (ft)	34	Basin Top Width (ft)	60.0
Basin Bottom Length (ft)	84	Basin Top Length (ft)	110.0
Basin Bottom Area (ft)	2,856	Basin Top Area (ft)	6,600
Top ofprirnary Riser (ft)	4	Top of Secondary Riser (ft)	4.5
Surface Area at Top of Riser (ft^2)	5,000	Primary Riser Diameter (in) •	24
Silt Storage Volume (yd^3)	124.4	Secon Riser Diameter in) ••	24

Concrete Anchor Desi

= VriseJOw
$= m^2 (H+X) f>w$
= Vconc (Orone - Ow)
Fbanchor 2: Fbriser
••• Vcone = 2.24r\H+X)



Primary Riser Anchor

H = Height of Riser (ft)	4
X = Pipe Invert to Bottom of Basin (ft)	3
r = Radius of Riser (ft)	1
$V_{00'''}$ (cy)	0.25

Secondary Riser Anchor

H = Height of Riser (ft)	4.5
X = Pipe Invert to Bottom of Basin (ft)	3
r = Radius of Riser (ft)	
V_{00nc} (cy)	0.25

• From Table 2 and 10-yr Rational Method for Mass Graded Condition (Q_{10}=5.73 cfs)
•• From Table 2 and 100-yr Rational Method for Mass Graded Condition (Q_{100}= 9.32 cfs)

LEGEND

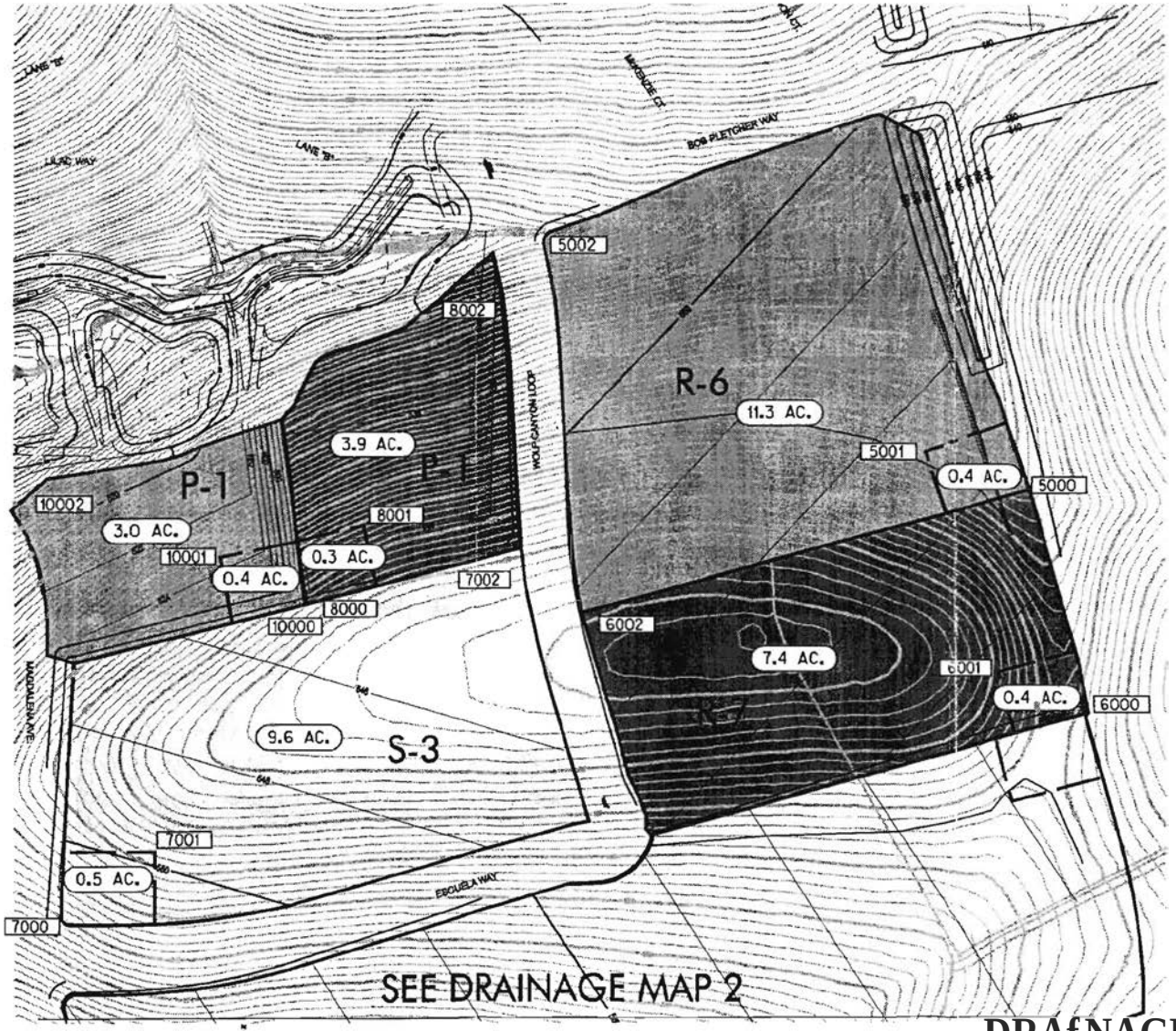
BASIN BOUNDARY

SUB-BASIN BOUNDARY

BASINS

(9.6 AC.) BASIN AREA (ACRES)

I 8002 I NODE NUMBER



200 100 0 200 400 600

GRAPHIC SCALE 1"= 200'

RICK ENGINEERING COMPANY

DRAINAGE MAP 1 FOR: ULTIMATE CONDITION McMILLIN OTAY RANCH VILLAGE 7

TABLE 2
RADIUS OF RISER VS. REQUIRED HEAD

DISCHARGE (cfs) $Q = Co 2\pi r Rs Ho^{3/2}$ (Co located on attached graph)

Rs = Radius of Riser
Ho = Head Above Riser

Ho(ft)	Rs=1.0	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2
1.0	15.6	14.9	14.8	14.1	13.5	12.3	11.1	10.0	9.4	7.7	5.8	3.9	2.0
1.1	25.4	24.4	22.2	20.3	20.4	18.4	17.5	15.1	12.9	10.2	7.6	5.0	2.8
1.2	36.0	34.2	32.1	31.0	28.7	25.0	23.4	19.5	15.4	12.7	9.2	6.0	3.4
1.3	47.4	47.2	41.8	40.4	37	32.7	27.7	24.0	19.9	14.8	10.9	7.0	4.0
1.4	60.5	55.8	52.7	49.8	44.0	37.9	33.5	27.8	22.7	17.1	12.4	8.0	4.5
1.5	75.1	66.9	64.8	56.9	50.9	44.4	39.7	32.1	25.9	19.5	14.1	9.3	5.1
1.6	87.3	81.3	72.0	65.9	58.1	50.0	43.5	35.7	26.9	21.7	15.9	10.3	5.6
1.7	100.3	92.0	82.6	73.4	65.1	55.5	47.9	39.2	32.1	23.9	17.5	11.4	6.2
1.8	112.6	101.8	98.9	80.6	72.5	61.1	52.9	43.9	35.0	26.4	19.1	12.4	6.7
1.9	125.4	111.8	109.4	90.4	78.6	67.1	57.5	47.6	38.4	28.9	20.7	13.4	7.3
2.0	135.0	121.3	118.8	97.3	84.8	72.9	62.5	51.2	40.9	31.1	22.3	14.5	7.9
2.1	148.6	132.4	126.7	104.3	91.8	78.4	67.6	55.6	43.8	33.2	23.8	15.5	6.4
2.2	158.5	143.1	135.1	111.5	98.0	84.3	71.4	58.9	46.7	35.5	25.4	16.5	9.0
2.3	170.6	152.1	144.4	119.7	105.4	91.1	76.1	62.6	49.6	37.8	27.0	17.6	9.5
2.4	180.6	163.1	154.4	127.4	111.6	96.1	80.9	66.2	52.6	40.0	28.6	18.6	10.1
2.5	192.7	172.2	162.4	135.5	117.8	101.9	84.4	69.9	55.5	42.2	30.2	19.6	10.7
2.6	203.3	181.2	170.4	142.6	112.5	107.3	89.9	73.6	58.4	44.4	31.8	20.6	11.2
	1.0	1.25	1.5	1.75	2.0	2.25	2.5	2.75	3.0	3.25	3.5	3.75	4.0	4.25	4.5	5.0

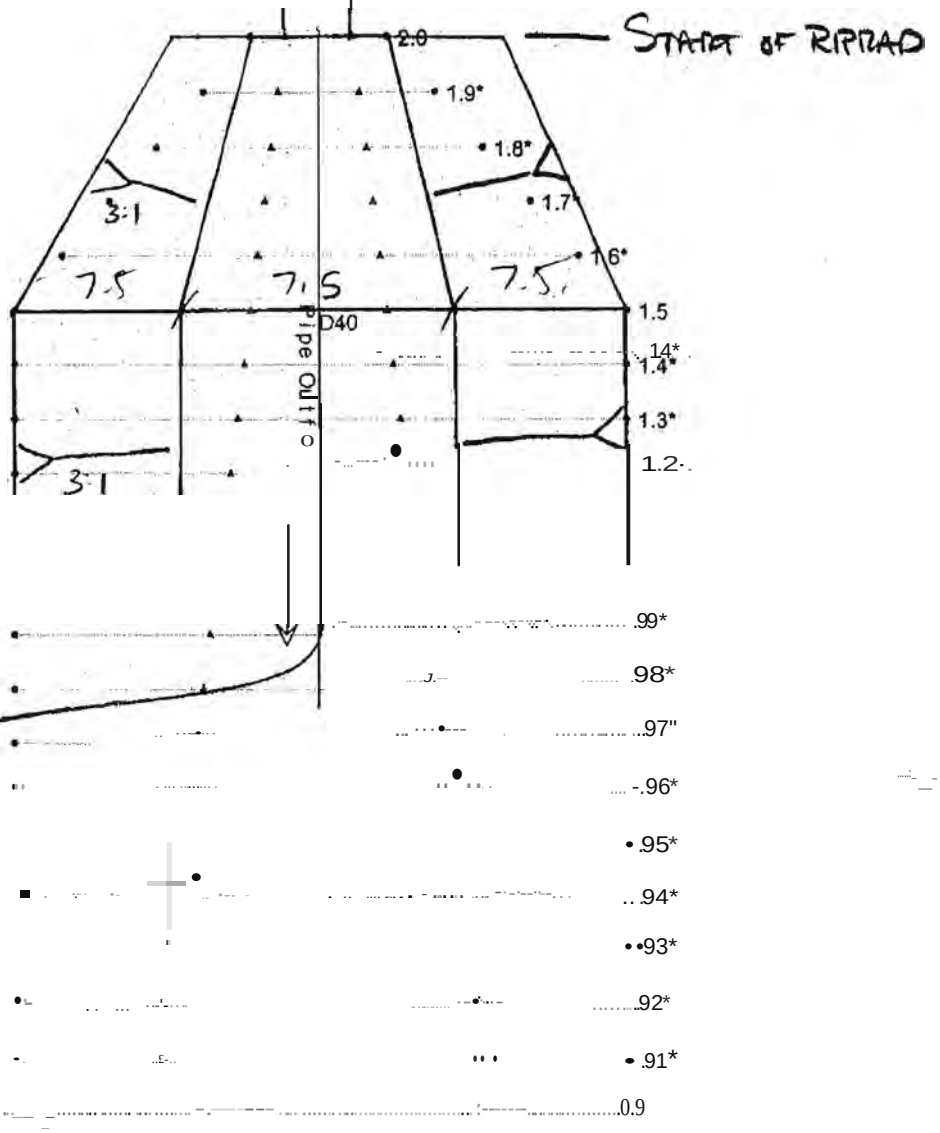
APPENDIX J

Riprap Calculations

OTAY RANCH VILLAGE 7
J-14531
10/22/04

BASIN 2000 LOS OF OUTLET TO RECEIVING WATER

NTS

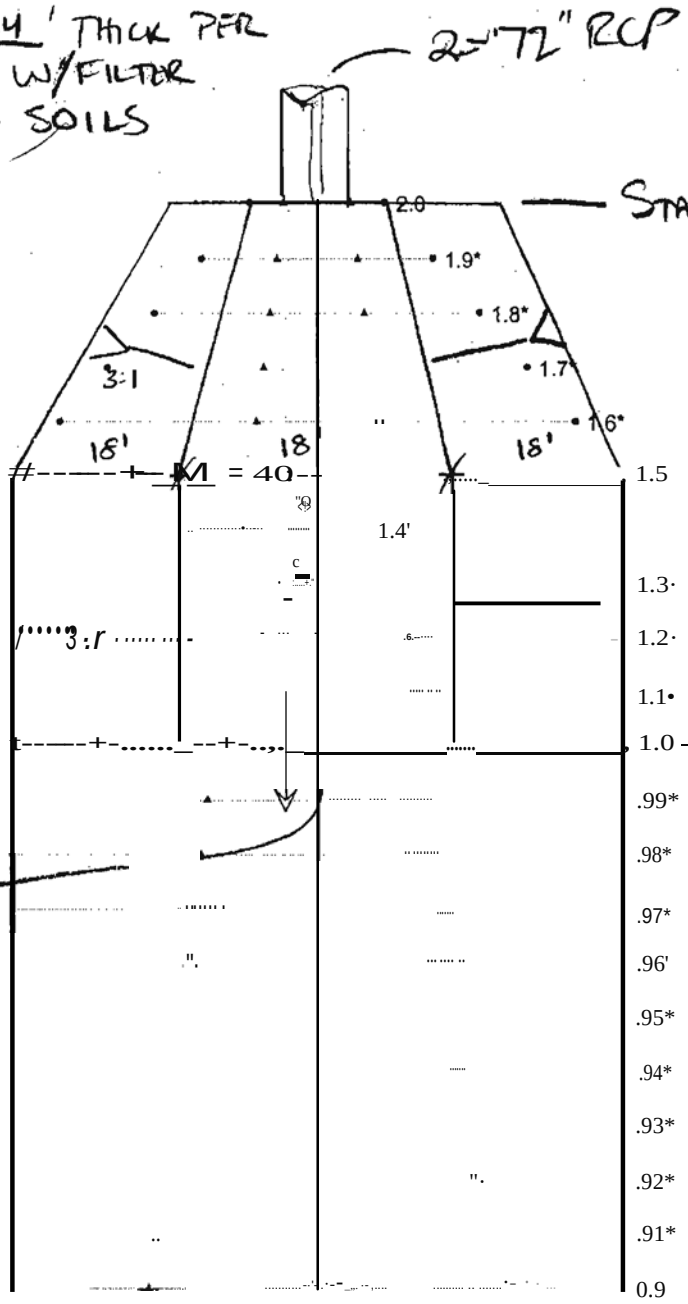


STAGE OF RIPRAP

OTAY RANCH VILLAGE 7
J-14531
10/22/04

BASIN DB#1-2

NOTE TO APPEAR ON PLANS:
34' X 54' 2ton CLASS RIP RAP ENERGY DISSIPATOR 5.4' THICK PER SDRSD D-40 W/FILTER MATERIAL PER SOILS ENGINEER



Grout for

otr

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BASIN DB#2 -3

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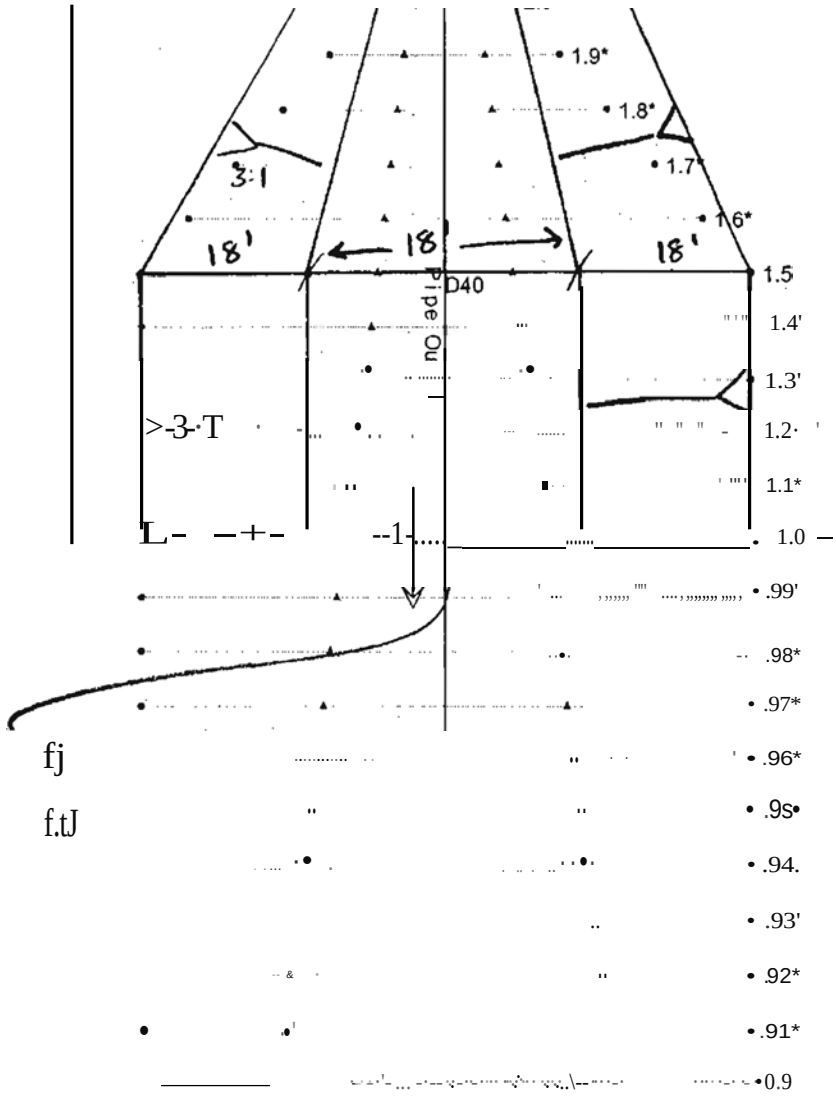
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Grout for 16'



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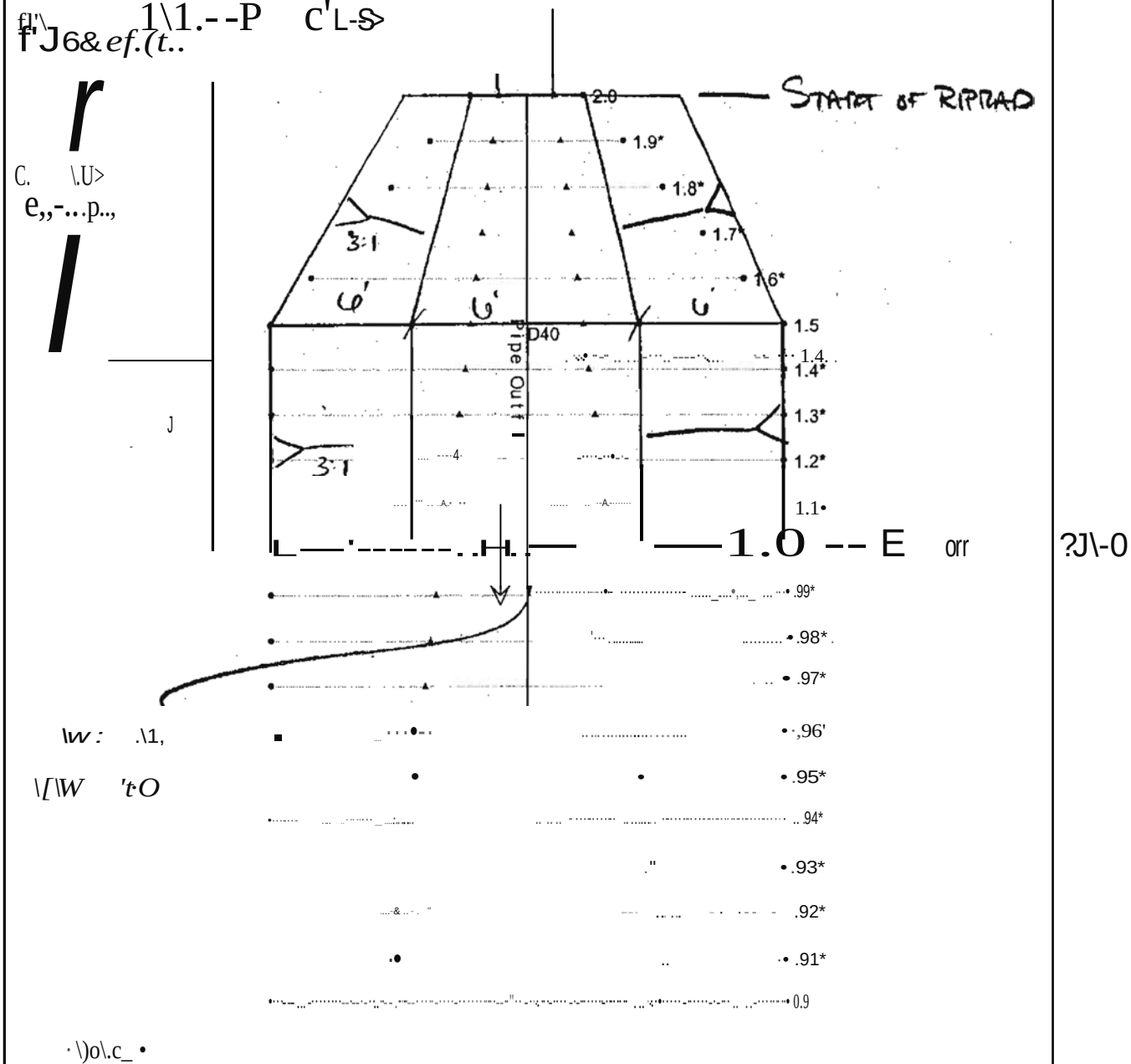
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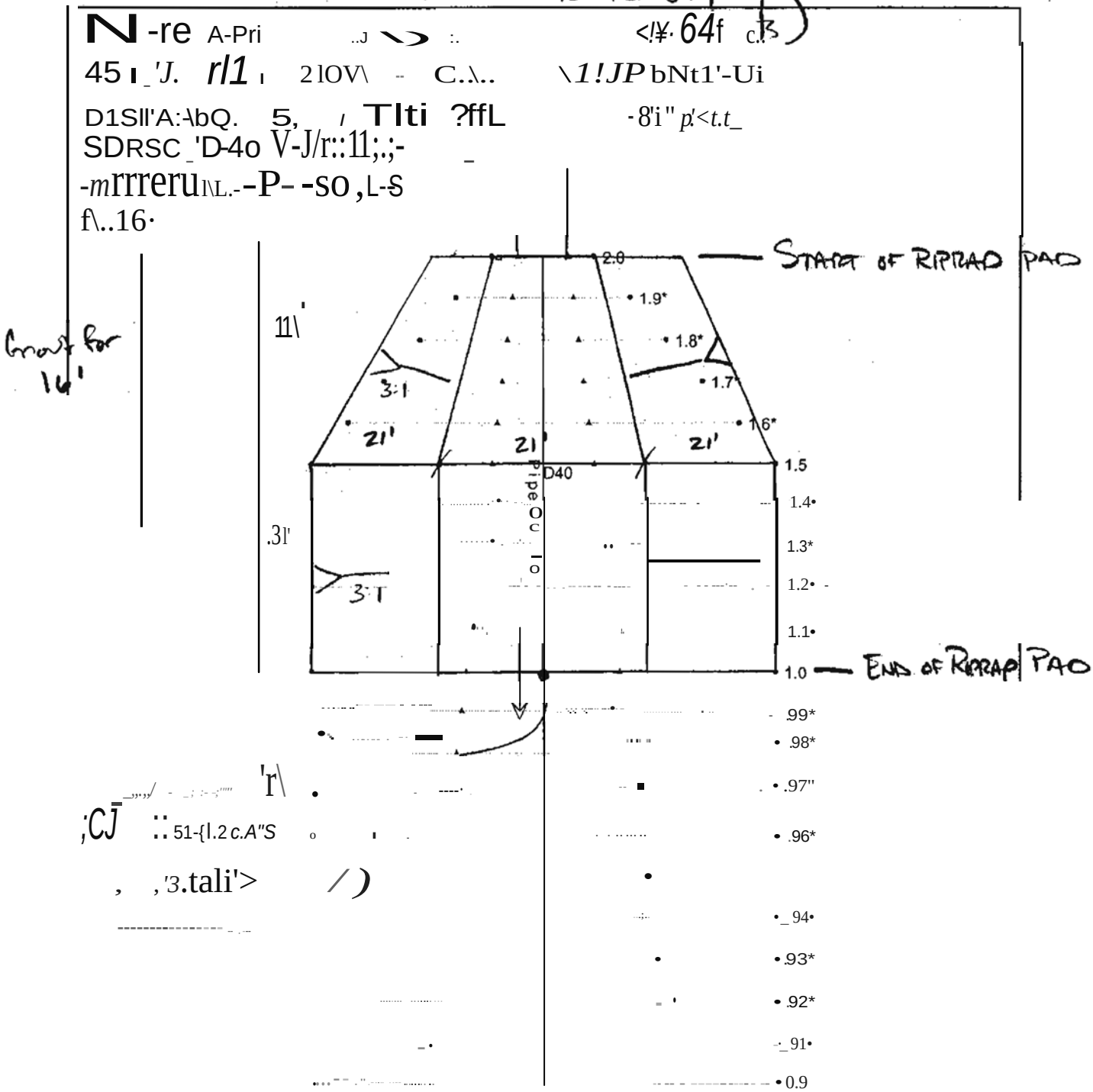
OTAY RANCH VILLAGE 7
J-14531
10/22/04

BASIN 11000 (OUTLET INTO U/S FOREBAY Q100 = 8.1 cfs)



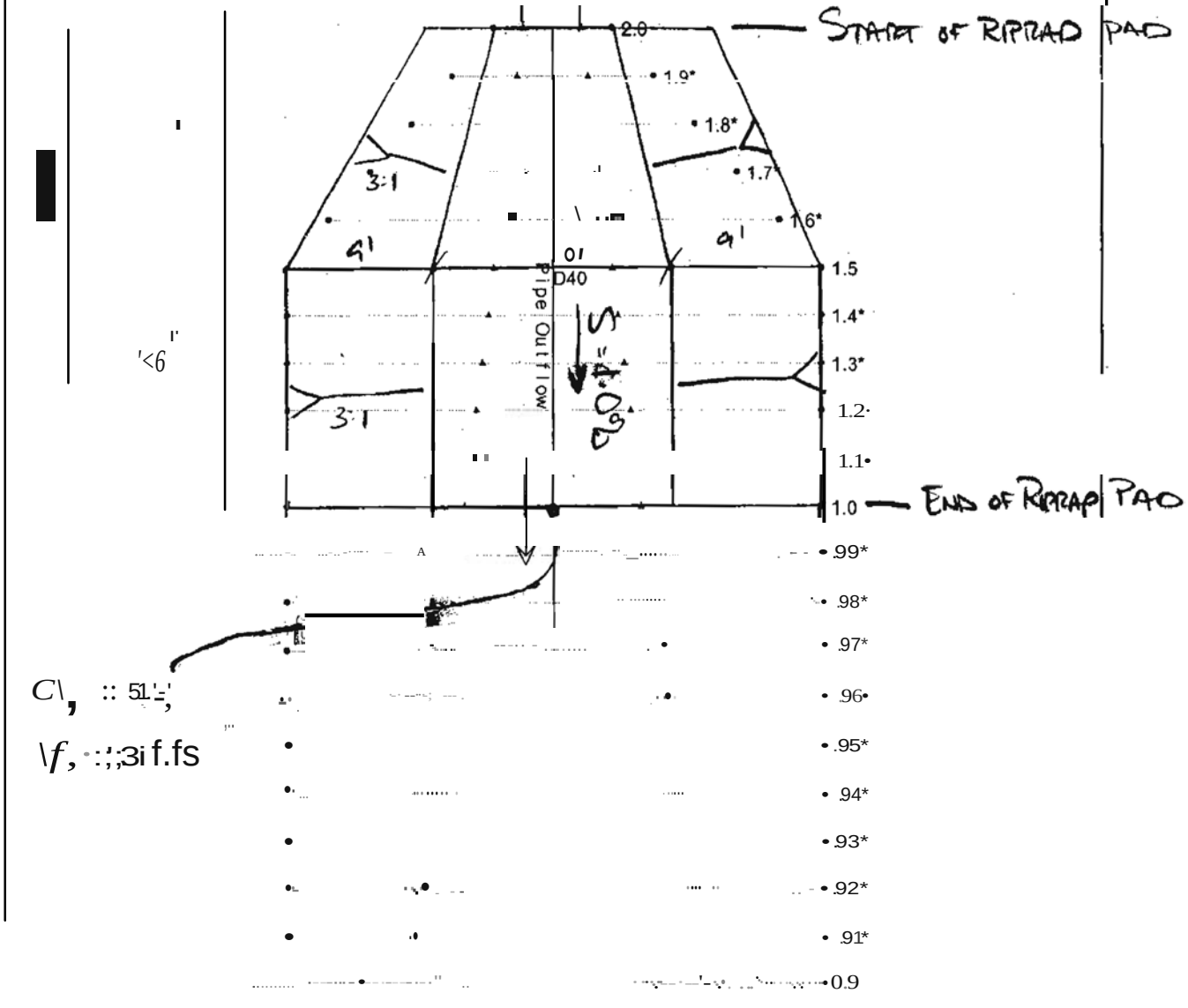
OTAY RANCH VILLAGE 7
J-14531
10/22/04

BASIN 12000 (D's on MAIN OUTLET - FROM ELIC - TO FOREBAY



OTAY RANCH VILLAGE 7
J-14531
10/22/04

BASIN 14000 (MAGDALENA & BIRCH RD)

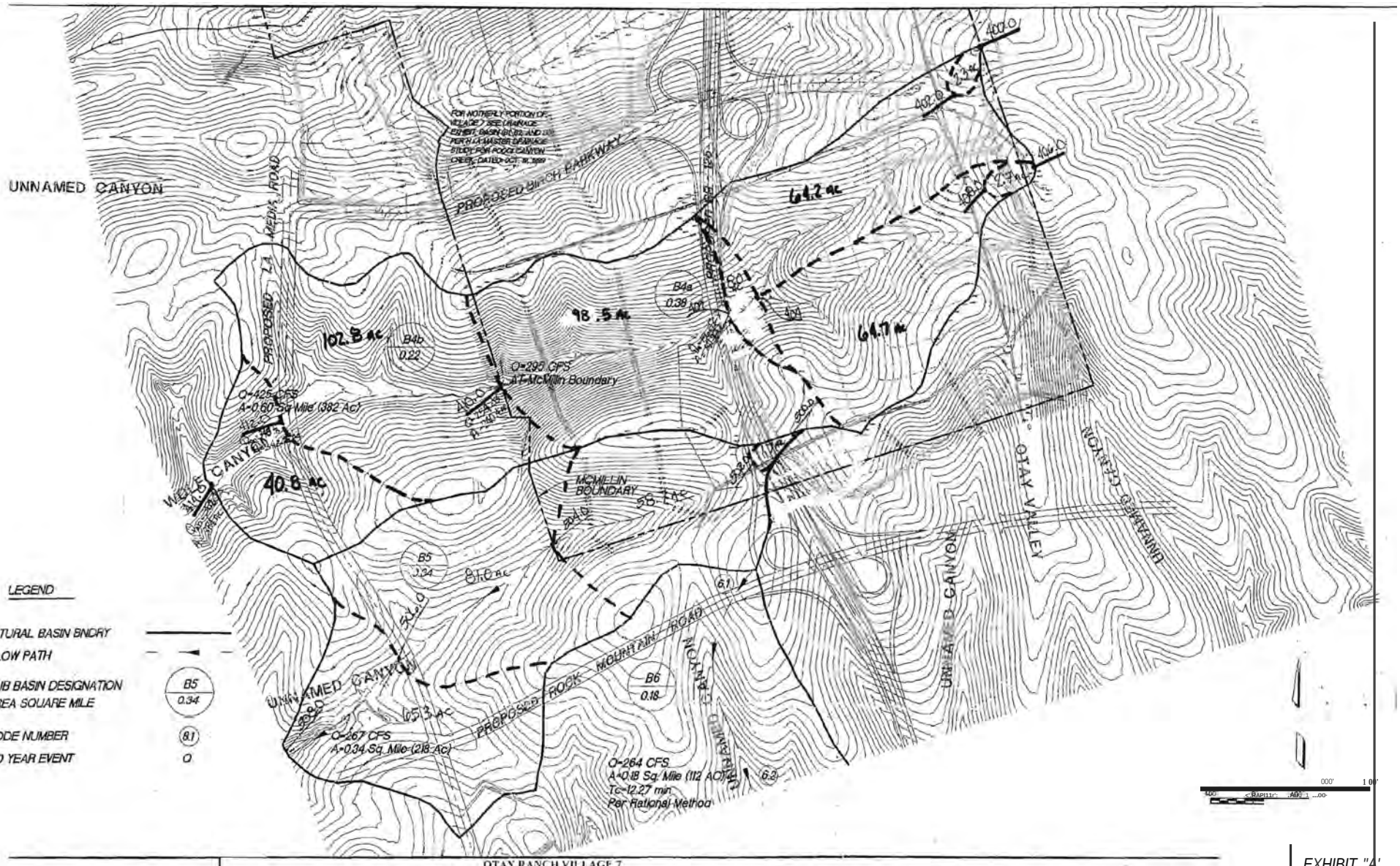




McMILLIN OTAY RANCH
VILLAGE 7 BASIN 2000
DRAINAGE MAP

RICK ENGINEERING COMPANY

SEE DRAINAGE MAP
BASIN 3000
MAGDALENA AVE
MAGDALENA AVE
SEE DRAINAGE MAP
BASIN 13000
LEGEN
BASIN
ERING COMPANY



OTAY RANCH VILLAGE 7
J-14483
08/18/03
PRE-PROJECT CONDITION
HYDROLOGY WORK MAP

EXHIBIT "A"

7/21/01

SHEET 1 OF 2

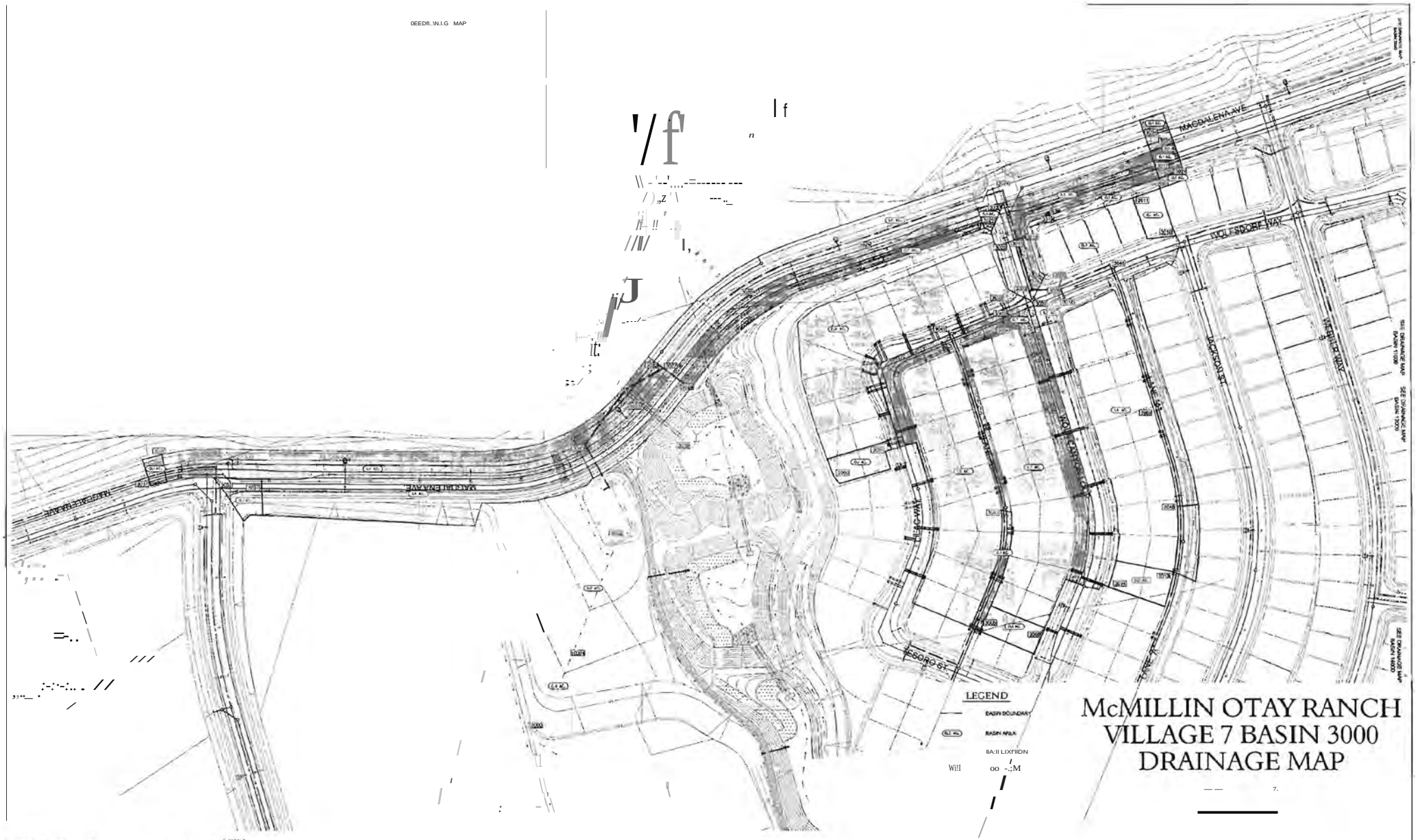


McMILLIN OTAY RANCH
VILLAGE 7 BASIN 1000
DRAINAGE MAP

RICK ENGINEERING COMPANY
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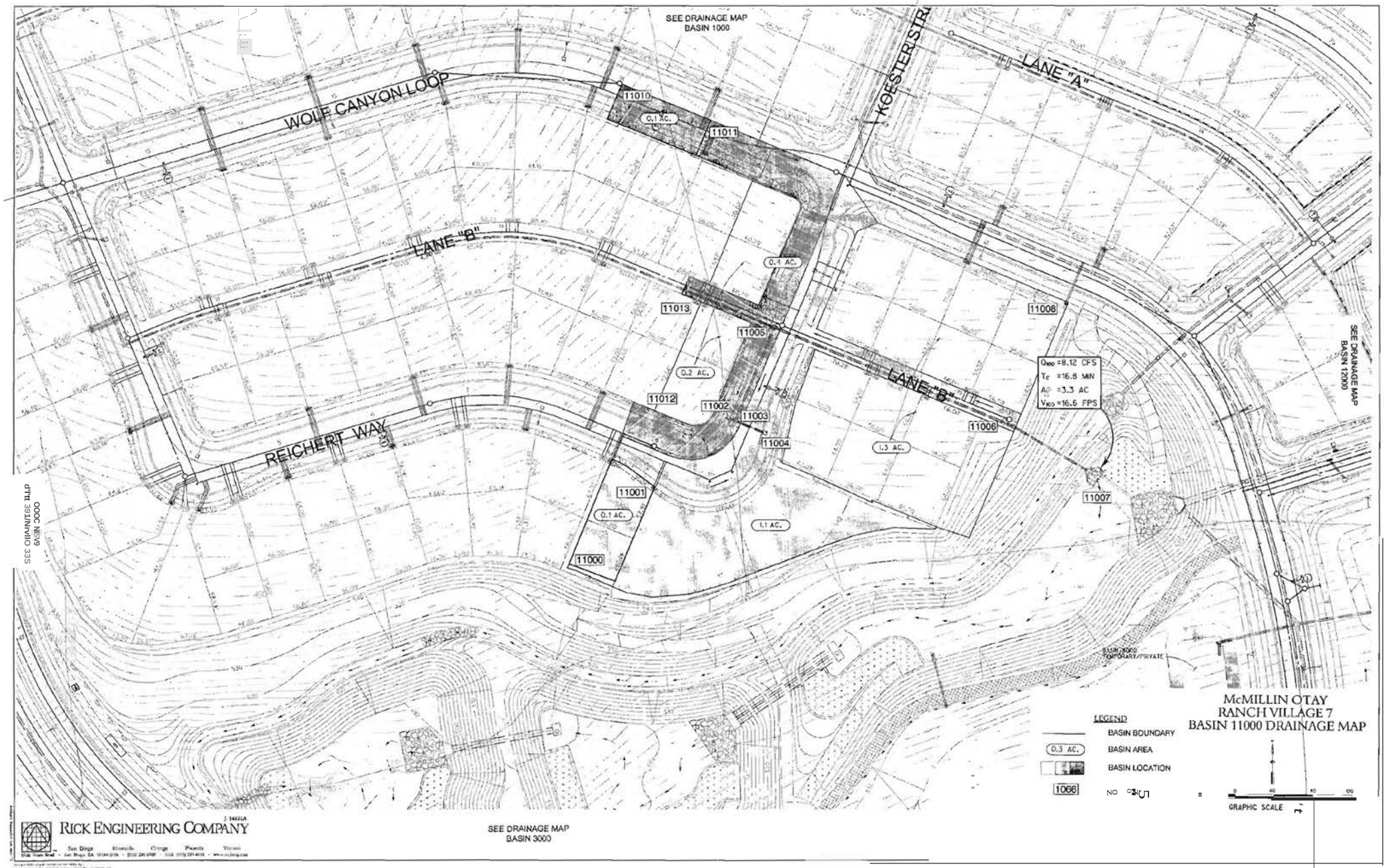
0EEDfL..\N.I.G MAP



McMILLIN OTAY RANCH VILLAGE 7 BASIN 3000 DRAINAGE MAP

RICK ENGINEERING COMPANY

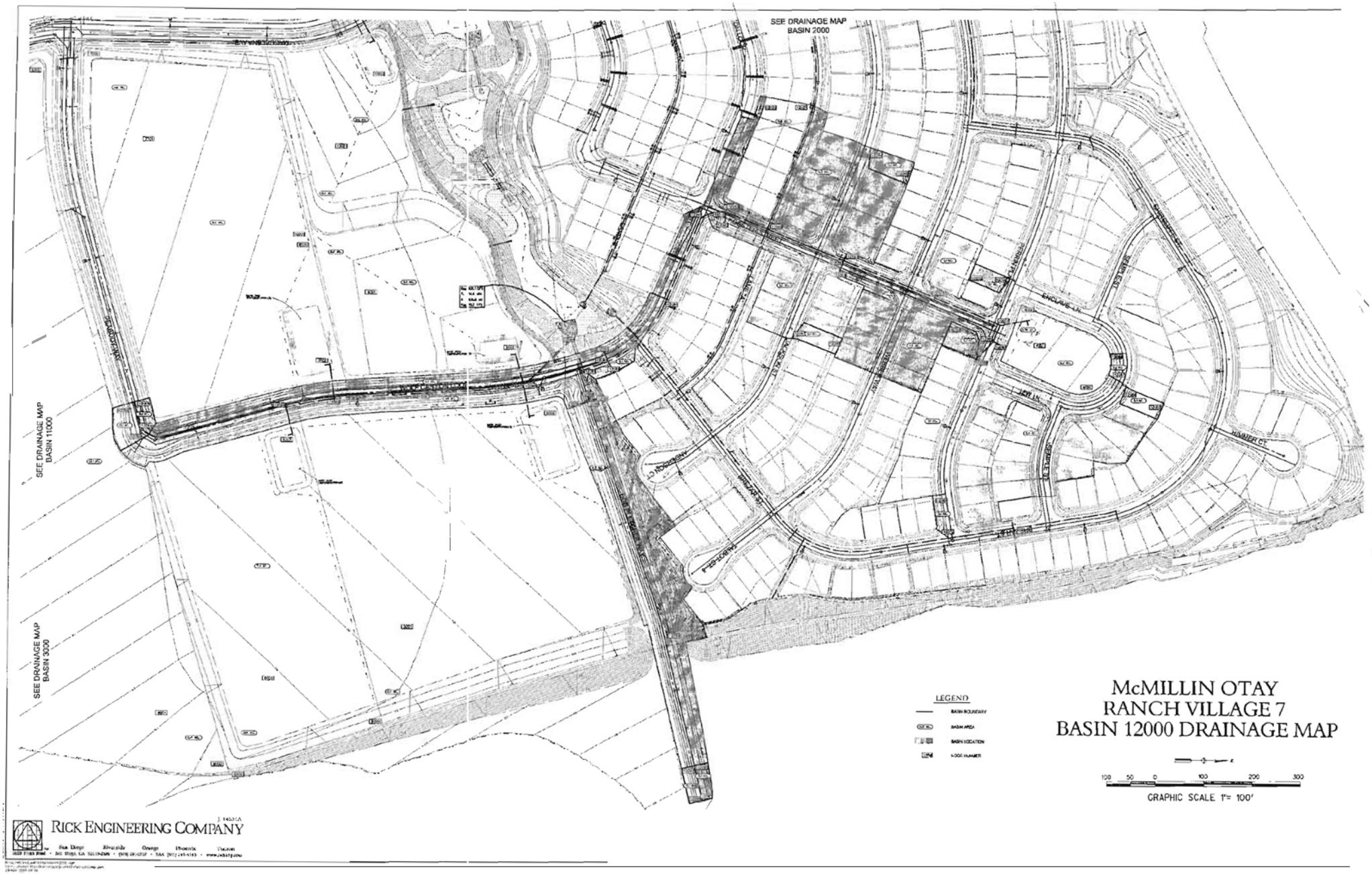
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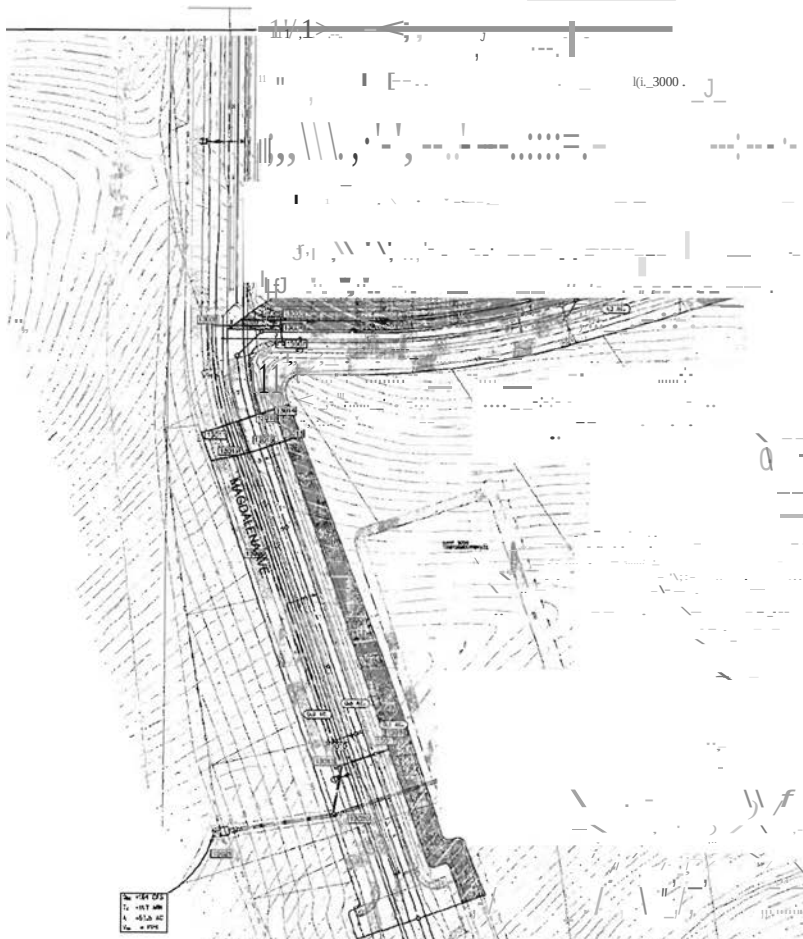


McMILLIN OTAY
RANCH VILLAGE 7
BASIN 11000 DRAINAGE MAP

RICK ENGINEERING COMPANY

J. 1433.1A


SEE DRAINAGE MAP
BASIN 2000
SEE DRAINAGE MAP
BASIN 11000
SEE DRAINAGE MAP
BASIN 3000
LEGEND
BASIN BOUNDARY
BASIN AREA
BASIN LOCATION
FLOOD HUMMER
McMILLIN OTAY
RANCH VILLAGE 7
BASIN 12000 DRAINAGE MAP
100 50 0 100 200 300
GRAPHIC SCALE 1"= 100'
RICK ENGINEERING COMPANY



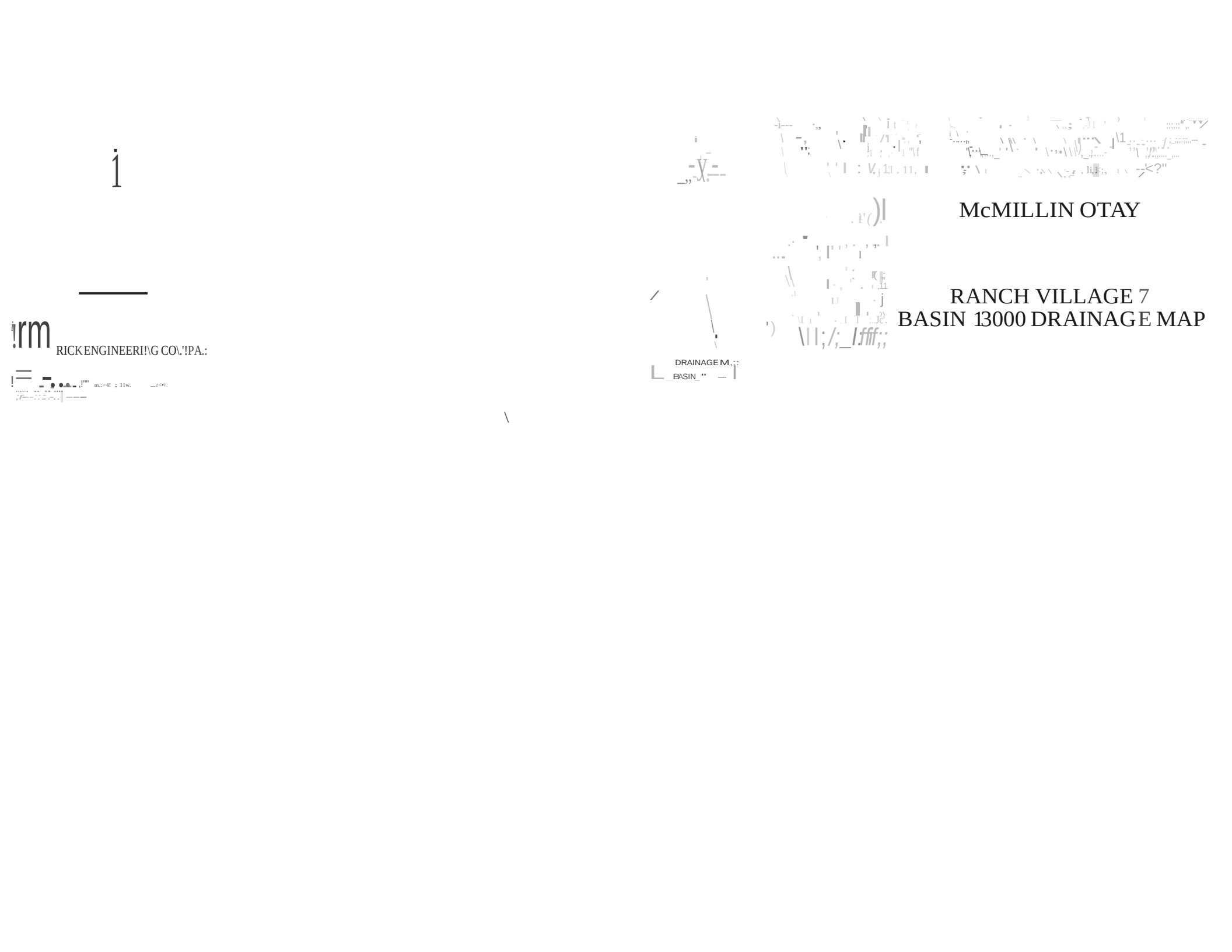
LEGEND

BASINBOUNDARY

BASIN AREA

BASIN LOCATION

NODE NUMBER


McMILLIN OTAY
RANCH VILLAGE 7
BASIN 13000 DRAINAGE MAP

HUNSAKER &ASSOCIATES
SAN DIEGO, INC.

PLANNING
ENGINEERING
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IRVINE
LOS ANGELES
RIVERSIDE
SAN DIEGO

ADDENDUM ROUGH GRADING HYDROLOGY STUDY for OTAY RANCH VILLAGE 7

City of Chula Vista, California

Prepared for
Otay Ranch Company
610 West Ash Street
Suite 1500
San Diego, CA 92101

W.O. 0025-349

May 3, 2006

Hunsaker & Associates
San Diego, Inc.



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CHAPTER 1 ADDENDUM SUMMARY

This Addendum to the Rough Grading Hydrology Study for Otay Ranch Village 7 is to revise the storm drain along Santa Luna Street on the south side of the project. Currently, the flow from the adjacent McMillan, Village 7 development is conveyed through a 48 inch storm drain along Santa Luna Street It is then directed south at approximate street station 21+15 and outlets at the bottom of a graded slope. This construction change keeps the same outlet on an interim condition. However, the ultimate alignment will have the 48" continuing west along Santa Luna to La Media where it will then head south. Another interim outlet is proposed along Santa Luna at approximate street station 11+05. The cleanouts at both interim outlets will include blocking the downstream 'ultimate' storm drain to divert flow during the interim condition. Two hydrologic and hydraulic models were run to simulate both interim and ultimate conditions. See the following sections for calculations.

Otay Ranch Village 7
Addendum Rough Grading Hydrology Study

HYDROLOGIC f\/10DEL
interim

```
**********************************************************  **********

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. l.SA Release Date: 01/01/2003  License ID 1239

                              Analysis prepared by:

                          HUNSAKER & ASSOCIATES - SAN DIEGO
                               10179 Huennekens Street
                                 San Diego, Ca. 92121
                                   (858) 558-4500

 ************************** DESCRIPTION OF STUDY ********************** *****
 * Otay Ranch Village 7 (Construction Change, Santa Luna)                  *
 * SO-Year Return Interval, INTERIM MODEL                                  *
* w.o. 25-349                                                              *
 ********************* ************************************** *************

  FILE NAME: H:\AES2003\0025\349\RG\V7RGSOCI.DAT
  TIME/DATE OF STUDY: 15:09 04/26/2006

  USER SPECIFIED HYDROLOGY <>ND HYDDi.LTL C MO'JEL INFORMZ1ION:

  2003 SAN DIEGO M.NUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR)    50.00
  6-                                          HOUR DURATION PRECIPITATION
    (INCHES) =                                2.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:  CURB   GUTTER -GEOMETRIES:  Ml'.NNING
     WIDTH   CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH   LIP   HIKE  FACTOR
NO.    (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
           =========  ========== ==== ====  ======       ======       ==== ===
  1   17.0      8.5    0.020/0. 020/0.020   0.50    1.50 0.0313 0.125 0.0160
  2   29.0     14.5    0.020/0 .020/0.020   0.50    1.50 0.0313 0.125 0.0130

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth)   (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*



**************************************************************************
  FLOW PROCESS FROM NODE    851.50 TO NODE    851.50 IS CODE =   7

  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
```

```
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  10.00   RAIN INTENSITY(INCH/HOUR) =  3.71
 TOTAL AREA(ACRES) =     5.00   TOTAL RUNOFF (CFS) =    164.00

****************************************************************************
 FLOW PROCESS FROM NODE    851.50 TO NODE    852.50 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================   ========================================
 ELEVATION DATA: UPSTREA.lvl(FEET} =   532.00   DOWNSTREAM(FEET)     493.00
 FLOW LENGTH(FEET} =   684.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)  26.02
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES    1
 PIPE-FLOW(CFS) =    164.00
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  10.44
 LONGEST FLOWPATH FROM NODE    321.00 TO NODE    852.50    6697.00 FEET.

************************************  ******************* ***********.*.****"**
 FLOW PROCESS FROM NODE    852.50 TO NODE    852.50 IS CODE =   1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

 TOTl.L NUMBER OF STREZl..MS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREP.M  1 ARE:
 TIME OF CONCENTRATION(MIN.)    10.44
 RAINFALL INTENSITY(INCH/HR) =   3.61
 TOTAL STREAM AREA (ACRES) =     5.00
 PE-11.K FLOW R."-TE (CFS} AT CONFLUENCE =    164.00

*****************************************************   ***************** *****
 FLOW PROCESS FROM NODE    861.00 TO NODE    862.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET} =    95.00
 UPSTREAM ELEVATION(FEET} =    537.00
 DOWNSTREAM ELEVATION(FEET) =    532.50
 ELEVATION DIFFERENCE(FEET) =     4.50
 SUBARE1'≥ OVERLAND TIME OF FLOW (MIN.) =    2.075
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    93.68
          (Reference: Table 3-lB of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS)       0.68
 TOTAL AREA(ACRES) =     0.13   TOTAL RUNOFF(CFS) =      0.68

************************** ************************** ******************
 FLOW PROCESS FROM NODE    862.00 TO NODE    863.00 IS CODE =  61
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<

UPSTREAM ELEVATION (FEET) =  532.00  DOWNSTREAM  ELEVATION (FEET)    498.00
STREET  LENGTH(FEET) =    577.00    CURB  HEIGHT(INCHES) =  6.0
STREET I-l..A.LFWIDTH(FEET) = 17.00

DISTANCE  FROM  CROWN  TO  CROSSFALL  GRADEBREAK(FEET)     8..50
INSIDE STREET CROSSFALL(DECIMAL)     0.020
OUTSIDE STREET CROSSFALL(DECIMA.L)      0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
STREET PARKWAY CROSSFALL(DECIMA.L)      0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section      0.0200

  **TRAVEL TIME COMPUTED USING ESTIMJlTED FLOW (CFS)          2.03
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET  FLOW DEPTH(FEET) =  0.25
  HALFSTREET  FLOOD  WIDTH (FEET) =     6.18
  ..VERA.GE FLO\"/ VELCCITY(Fi::EI/SEC.)       -±.07
  PRODUCT  OF  DEPTH&VELOCITY(FT*FT/SEC.)      l.02
STREET FLOW TRAVEL TIME(MIN.) =    2.36    Tc (MIN.)      4.44
  50 YEAR R11.INFALL INTENSITY(INCH/HOUR)     5.796
NOTE: RAINF11,.L L INTENSITY IS BASED ON Tc = 5-MINUTE.
*USER SPECIFIED(SUBARE?..I:
NEIGHBORHOOD  COMMERCIAL  RUNOFF  COEFFICIENT  =  ..9000
S.C.S.  CURVE  NUMBER  (p1'JC II) =    0
AREA-AVERAGE RUNOFF COEFFICIENT     0.900
SUBAREA AREA(ACRES)       0.52      SUBAREA  RUNOFF(CFS)  =     2..71
TOTAL  AREA(ACRES)  =       0.65        PEAK  FLOW  RATE (CFS)          3..39

END OF SUBAREA STREET FLO\-V HYDR Zl.ULICS:
DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET)      7.93
FLOW  VELOCITY(FEET/SEC.) =  4..54   DEPTH*VELOCITY(FT*FT/SEC  .)      1.29
LONGEST  FLOWPATH  FROM  NODE     861.00  TO  NODE     863.00  =    672.00 FEET..

****************************************************************************
  FLOW PROCESS FROM NODE     863.00 TO NODE     852.50 IS CODE =    1

  >>>>>DESIGNATE  INDEPENDENT  STREAM  FOR  CONFLUENCE<<<<<

  TOTAL  NUMBER  OF  STREAMS  =  3
  CONFLUENCE  VALUES  USED  FOR  INDEPENDENT  STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)      4.44
  RZl.INFALL INTENSITY(INCH/HR) =    5..80
  TOTAL  STREAM  AREA(ACRES) =      0..65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.39

****************************************************************************
  FLOW PROCESS FROM NODE     866.00 TO NODE     867.00 IS CODE =   21

  >>>>>RATIONAL METHOD INITIAL SUBAREA  ..NALYSIS<<<<<
================================== ================================== =
  *USER SPECIFIED(SUBAREA):
  NEIGHBORHOOD COMMERCI..L RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (I I.MC II) =    0
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   146.00
 UPSTREAM ELEVATION(FEET) =    537.00
 DOWNSTREAM ELEVATION(FEET) =    532.50
 ELEVATION DIFFERENCE(FEET) =      4.50
 SUBfl_REA OVERLAND TIME OF FLOW(MIN.) =    2.286
 WARNING: INITIZU, SUBAREA FLOW PATH LENGTH IS GREATER T1Ll\N
          THE Mf\JCIMUM OVERLAND FLOW LENGTH =    85.41
          (Reference: Table 3-lB of Hydrology Manual)
          THE Mf\JCIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS)        0.73
 TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.73

****************************************************************    *******
 FLOW PROCESS FROM NODE    867.00 TO NODE    868.00 IS CODE =  61

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<

 UPSTREz:J/i ELEVATION(FEET)=   532.00  DO\'ilTSTRS&; ELEV'ATION(FEET)     ""197.C0
 STREET LENGTH(FEET) =   581.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) =  17.00

 DISTANCE FROM CROWN TO CROSSF?LL G.FU\DEBRED,K(FEET)      8.5•)
 INSIDE STREET CROSSFALL(DECIMAL)    0 C20
 OUTSIDE STREET CROSSFALL(DECfrL"L)      0.020

 SPECIFIED NUMBER OF HALFSTREETS CA..RRYING RUNOFF    1
 STREET PAP.K\AY CROSSFALL(DECH-Lt:\.L)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.24
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    6.45
   AVERAGE FLOW VELOCITY(FEET/SEC.)      4.20
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      1.07
 STREET FLOW TRAVEL TIME(MIN.) =   2.31   Tc(MIN.)     4.59
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT    0.900
 SUBAREA t\.REA(ACRES)     0.58      SUBAREA RUNOFF(CFS) =    3.03
 TOTAL AREA(ACRES) =      0.72        PEAK FLOW RATE(CFS)         3.76

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD inDTH(FEET)    8.25
 FLOW VELOCITY(FEET/SEC.) =  4.70   DEPTH*VELOCITY(FT*FT/SEC.) =   1.37
 LONGEST FLOWPATH FROM NODE    866.00 TO NODE    868.00 =   727.00 FEET.

************************** ********************************************  ***
 FLOW PROCESS FROM NODE    868.00 TO NODE    852.50 IS CODE =   1
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE V.RIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.)     4.59
  RAINFALL INTENSITY(INCH/HR) =   5.80
  TOTAL STREAM AREA(ACRES) =      0.72
  PEZ\.K FLOW RATE(CFS) AT CONFLUENCE =      3.76

  ** CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       164.00     10.44        3.606          5.00
      2         3.39      4.44        5.796          0.65
      3         3.76      4.59        5.796          0.72

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PE_:( FLO:· ?...TE TABLE *
  STREAJ'      RUNOFF       Tc       INTENSITY
  l.JUMBER      (CFS)     (MIN.)    (INCH/HOUR)
      1        76.72      4.44        5.796
      2        79.29      4.59        5.796
      3       168.45     10.44        3.606

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)      168.45   ':Lc(iHN.) =    10.44
  TOTAL AREA(ACRES) =     6.37
  LONGEST FLOWPATH FROM NODE    321.00 TO NODE     852.50    5697.00 FEET.

************************ ********************************  ************ ****
  FLOW PROCESS FROM NODE    852.50 TO NODE    864.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   493.00 DOWNSTREAM(FEET)      492.00
  FLOW LENGTH(FEET) =    23.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)    23.73
  ESTIMATED PIPE DIAMETER(INCH) = 42.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =    168.45
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  10.45
  LONGEST FLOWPATH FROM NODE    321.00 TO NODE    864.00    6720.00 FEET.

+----------------------------------------------------------------------------+


+----------------------------------------------------------------------------+

************************************  ***************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE    902.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUB.REA ANALYSIS<<<<<
```

```
*USER SPECIFIED(SUBAREA) :
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUB.REA FLOW-LENGTH(FEET) = 95.00
UPSTREAM ELEVATION(FEET) = 497.00
DOWNSTREAM ELEVATION(FEET) = 492.25
ELEVATION DIFFERENCE(FEET) = 4.75
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.052
SO YEAR RAINFALL INTENSITY(INCH/HOUR) S.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = S-MINUTE.
SUBAREA RUNOFF (CFS) 0.52
TOTAL AREA(ACRES ) = 0.10 TOTAL RUNOFF (CFS) = 0.52

****************************************************************************
FLOW PROCESS FROM NODE 902.00 TO NODE 903.00 IS CODE = 61

:>:>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>> (STANDARD CURB SECTION USED )<<<<<

UPSTRE!"-11 ELEVATION (FEET) = -±90.00 DO\WST?.E"J ELEV_i:TION (FEET) 4.60.00
STREET LENGTH (FEET) = 800.00 CURB HEIGHT (ETCHES) = 6.0
STREET HALFWIDTH(FEET) = 17.00

DIST!1NCE FROM CRm"TN TO CROSSF.LL GRJUlEBREAK (FEET) S.50
INSIDE STREET CROSSFALL(DECIMAL) 0.020
OUTSIDE STREET CROSSFALL(DECIMAL ) 0.J2C

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUHOFF 1
STREET PZill.KWAY CROSSFALL(DECIMAL ) 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) 2.70
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.28
HALFSTREET FLOOD WIDTH(FEET) = 7.93
AVERAGE FLOW VELOCITY(FEET/SEC.) 3.62
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) 1.03
STREET FLOW TRAVEL TIME(MIN.) = 3.68 Tc (MIN.) S.73
SO YEAR RAINFALL INTENSITY(INCH/HOUR) S.308
*USER SPECIFIED(SUBAREA):
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT 0.900
SUBAREA AREA(ACRES) 0.91 SUBAREA RUNOFF(CFS) = 4.3S
TOTAL AREA(ACRES) = 1.01 PEAK FLOW RATE(CFS) 4.83

END OF SUBAREA STREET FLOv1 HYDRAULICS:
DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) 10.26
FLOW VELOCITY(FEET/SEC.) = 4.12 DEPTH*VELOCITY(FT*FT/SEC.) 1.37
LONGEST FLOWPATH FROM NODE 901.00 TO NODE 903.00 = 89S.OO FEET.

********** ********** x ****** ********* ********* ** ***** ********** *
FLOW PROCESS FROM NODE 903.00 TO NODE 904.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

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==========================================================================    ====== =
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION (MIN.)      5.73
  RAINFALL  INTENSITY(INCH/HR)  =    5.31
  TOTAL STREAM AREA(ACRES) =      1.01
  PEA1< FLOW RATE (CFS) AT CONFLUENCE  =       4.83

****************************************************************************
  FLOW PROCESS FROM NODE     911.00 TO NODE     912.00 IS CODE =  21

  >>>>>RATIONAL METHOD INITIAL SUBAREA l\NALYSIS<<<<<

  *USER SPECIFIED(SUBAREA) :
  NEIGHBORHOOD COMMERCIF..L RUNOFF COEFFICIENT =  .9000
  S.C.S. CURVE N1JMBER  (AMC II) =    0
  INITIF..L SUBAREA FLOW-LENGTH(FEET) =     95.00
  UPSTREAM  ELEVATION(FEET)  =     498.00
  DOWNSTREAM  ELEVATION(FEET)  =     493.25
  ELEVATION  DIFFERENCE(FEET)  =       4.75
  SUB!\.REA O\ERLAND TIME OF F::.,0\1'.'It .)  =      2 .0 52
    50 YEllR PJ\.INFALL INTENSITY( t-JC;.{/HOUR)      5 .i %
  HOTE:  RAIN?ALL  INTENSITY  IS  3ASED  ON  Tc  =  5-iHNUTE.
  SUBAREA  RUNOFF(CFS)          0.57
  TOTAL  AREA(ACRES)  =       0.11    T0T_:C_L PJNOFF(C?S) =         ) 07

**************************** ****************** k ** ** * *** *** **** ***** * * **** *
  FLOW  PROCESS  FROM  NODE     912.00  TO  NODE     913.00  IS  CODE  =   61

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBARE.ll<<<<<
  >>>>>(STF.NDARD CURB SECTION USED)<<<<<

  UPSTREAM  ELEVATION(FEET)  =   490.00   DOWNSTREAM  ELEVATION (FEET)     460.00
  STREET  LENGTH(FEET)  =    780.00    CURB  HEIGHT(INCHES)  =   6.0
  STREET HALFWIDTH(FEET)  =  17.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)      8.50
  INSIDE STREET CROSSFALL(DECIMAL)     0.020
  OUTSIDE  STREET  CROSSFF..LL(DECIM.l\.L)      0.020

  SPECIFIED NUMBER OF   -LFSTREETS CARRYING RUNOFF     1
  STREET PARKWAY CROSSFA..LL(DECIMAL)     0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)      0.0160
  Manning's  FRICTION  FACTOR  for  Back-of-Walk  Flow  Section      0.0200

    **TRAVEL  TIME  COMPUTED  USING  ESTIMATED  FLOW (CFS)          3.49
    STREETFLOW  MODEL  RESULTS  USING  ESTIMATED  FLOW :
    STREET  FLOW  DEPTH(FEET)  =   0.30
    HALFSTREET  FLOOD  WIDTH(FEET)  =     8.87
    AVERAGE  FLOW  VELOCITY(FEET/SEC.)       3.86
    PRODUCT  OF  DEPTH&VELOCITY(FT*FT/SEC.)        1.17
  STREET  FLOW  TRAVEL  TIME(MIN.)  =    3.37    Tc(MIN.)      5.42
    50 YEl:l.R RAINFALL INTENSITY(INCH/HOUR)     5.500
  *USER  SPECIFIED(SUBAREA) :
  NEIGHBORHOOD  COMMERCIAL  RUNOFF  COEFFICIENT  =  .9000
  S.C.S.  CURVE  NUMBER  (AMC II) =    0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.900
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SUBAREA AREA(ACRES)       1.17      SUBAREA RUNOFF(CFS) =     5.79
TOTAL AREA(ACRES) =       1.28        PEAK FLOW RATE(CFS)          6.34

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) =  0.36   H.. FSTREET FLOOD WIDTH(FEET)    11.46
FLOW VELOCITY (FEET/SEC.) =   4.43   DEPTH*VELOCITY (FT*FT/SEC.)      1.57
LONGEST FLOWPATH FROM NODE    911.00 TO NODE    913.00 =   875.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    913.00 TO NODE    904.00 IS CODE =    1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.)      5.42
RAINFALL INTENSITY(INCH/HR) =    5.50
TOTAL STREAM AREA(ACRES) =      1.28
PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.34

** CONFLUENCE DATA **
STREAM      RUNOFF       TC        INTENSITY        AREA
NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        4.83      5.73         5.308          1.01
     2        6.34      5.42         5.500          1.28

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF       TC        INTENSITY
NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1       10.90      5.42        5.500
     2       10.94      5.73        5.308

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS)       10.94    TC(MIN.) =     5.73
TOTAL AREA(ACRES) =       2.29
LONGEST FLOWPATH FROM NODE    901.00 TO NODE    904.00     895.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    904.00 TO NODE    915.00 IS CODE =   31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) =   455.00   DOWNSTREAM(FEET)      454.00
FLOW LENGTH(FEET) =   120.00    MANNING'S N =  0.013
DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.)        6.47
ESTIMATED PIPE DIAMETER(INCH) =  21.00     NUMBER OF PIPES     1
PIPE-FLOW(CFS) =     10.94
PIPE TRAVEL TIME(MIN.) =    0.31     TC(MIN.) =    6.04
LONGEST FLOWPATH FROM NODE    901.00 TO NODE    915.00    1015.00 FEET.

****************"********"****"*"**********************************
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 FLOW PROCESS FROM NODE     915.00 TO NODE     915.00 IS CODE =  10

 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
================================================================================

**************************************************************    ***************
 FLOW PROCESS FROM NODE     881.00 TO NODE     882.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED (SUBAREA) :
 OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT =  .6000
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    576.00
 DOWNSTREAM ELEVATION(FEET) =    571.00
 ELEVATION DIFFERENCE(FEET) =      5.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.264
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    5.608
 SUBJ1RE.Z:> RUNOFF (CFS)      3.43
 TOTAL AREA(ACRES) =       1.02   TOT?L RUNOFF (CFS)        3.43

**********k• ••••••**********************************  ************** ***********
 FLOW PROCESS FROM NODE     882.00 TO NODE     883.00 IS CODE =  31

 >>>>>COMPUTE P PE-FL0'.7 TP<',.VEL THJE TER.U SUB. E::<<<<<
 >>>>>USING COMPUTER-ESTIMATED ?IPESIZE (NON-PRESSURE FLOW)<<<<<
== ===== ===== = = ========== ==== = == == == === == == ========= == ===  =  ========== ===
 ELEVATION D?TA: UPSTREAil(fEi::i) =    563.00   o:NSTEE.r..:-:(rEET/
 FLOW LENGTH(FEET) =  8449.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     5.02
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES      1
 PIPE-FLOW(CFS) =      3.43
 PIPE TRAVEL TIME(MIN.) =  28.04    Tc(MIN.) =  33.30
 LONGEST FLOWPATH FROM NODE     881.00 TO NODE     883.00    8549.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     882.00 TO NODE     883.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.706
 *USER SPECIFIED(SUBAREA):
 OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT    .6000
 S.C.S. CURVE NUMBER (AMC II) =  0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
 SUBAREA AREA(ACRES)      15.48   SUBAREA RUNOFF(CFS)     15.85
 TOTAL AREA(ACRES)        16.50   TOTAL RUNOFF(CFS) =    16.89
 TC(MIN.) =  33.30

****************************************************************************
 FLOW PROCESS FROM NODE     884.00 TO NODE     883.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
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  50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.706
 *USER SPECIFIED(SUBAREA):
 OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT    .6000
 S.C.S. CURVE NUMBER  (AMC II) =    0
 AREA-AVERAGE RUNOFF COEFFICIENT  =  0.6000
 SUBAREA AREA(ACRES )      2.58    SUBAREA RUNOFF(CFS)      2.64
 TOTAL AREA(ACRES)        19.08    TOTAL RUNOFF(CFS) =    19.53
 TC(MIN.) =   33.30

****************************************************************************
 FLOW PROCESS FROM NODE     883.00 TO NODE     885.00 IS CODE =   31

 >>>>>COMPUTE PIPE-FLOlv TRlWEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM (FEET) =    492.00   DOWNSTREAM (FEET)     462.00
 FLOW LENGTH (FEET) =    668.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4  INCHES
 PIPE-FL0\'7 VELOCITY (FEET/SEC.)     13 .90
 ESTIM.i:\.TED PIPE DIAMETER(INCH) =   18 .00    NUMB:SR OF PIPES
 2IPE-FLOW(CFS) =     19.53
 PIPE TRAVEL TIME (MIN.) =    0.80    Tc (MIN.) =  34.11
 LONGEST FLOWPATh FROM NODE     881.00 'T0 i ODE     885.00

****************************************************************************
 FLO\i PROCESS F"RCM !TOD:::     833.0C T'J 1:E      385 .00  IS   D2 =   El

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

  50 YEAR RAINFALL INTENSITY (INCH/HOUR) =  1 .680
 *USER SPECIFIED (SUBAREA):
 PERENNIAL GRASS FAIR COVER RUNOFF COEFFICIENT =  .6500
 S.C.S. CURVE NUMBER  (AMC II) =    0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6015
 SUBAREA AREA(ACRES)       0.60    SUBAREA RUNOFF (CFS)      0.66
 TOTAL AREA(ACRES)        19.68    TOTAL RUNOFF(CFS) =    19.89
 TC(MIN.) =   34.11

************************   ************************************************
 FLOW PROCESS FROM NODE     885.00 TO NODE     885.00 IS CODE =    1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE V.l:\.LUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.)    34.11
 RAINFALL INTENSITY (INCH/HR) =    1.68
 TOT .L STREAM AREA(ACRES) =    19.68
 PEAK FLOW RATE (CFS) AT CONFLUENCE =      19.89

************************************   ************************** ******
 FLOW PROCESS FROM NODE     891.00 TO NODE     892.00 IS CODE =   21

 >>>>>RATIONAL METHOD INITIAL SUBAREA _NALYSIS<<<<<

 *USER  SPECIFIED(SUBAREA):
 OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT =  .6000
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 S.C.S. CURVE NUMBER (AMC II) =    0
 INITIAL SUBZl,REA FLOW-LENGTH(FEET) =    100.00
 UPSTREAM ELEVATION(FEET) =     575.00
 DOWNSTREAM ELEVATION(FEET) =     570.00
 ELEVATION DIFFERENCE(FEET) =       5.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =     5.264
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     5.608
 SUBAREA RUNOFF(CFS)         0.87
 TOTAL AREA(ACRES) =       0.26   TOTAL RUNOFF(CFS)         0.87

****************************************************************************
 FLOW PROCESS FROM NODE     892.00 TO NODE     893.00 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<

 ELEVATION DATA: UPSTRE ..M (FEET) =    567.00   DOWNSTREAM(FEET)     465.00
 FLOW LENGTH(FEET) =    650.00    MANNING'S N =  0.013
 ESTIMATED PIPE DI ..METER (INCH) INCREASED TO 18.000
 DEPTH OF FLOvl IN  18.0 INCH PIPE IS1.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)     9.33
 ESTIMATED PIPE DIAMETER(INCH) =  18.00     NUMBER OF PIPES      1
 PI?E-FLO (CFS) =       C.87
 PIPE TRAVEL TIME(MIN.) =    1.16     Tc(MIN.) =    6.42
 LONGEST FLOWPATH FROM NODE     891.00 TO NODE     893.00     750.00 FEET.

****************************************  ************************************
 FLOW PROCESS FROM NODE     892.00 TO NODE     885.00 IS CODE =  81

 >>>>>ADDITION OF SUB..REA TO MJ:\.INLINE PEAK FLOW<<<<<

   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.931
 *USER SPECIFIED(SUB..REA):
 OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT    .6000
 S.C.S. CURVE NUMBER (AMC II) =    0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
 SUBAREA AREA(ACRES)      3.26   SUBAREA RUNOFF(CFS)      9.64
 TOTAL AREA(ACRES)        3.52   TOTAL RUNOFF(CFS) =    10.41
 TC(MIN.) =    6.42

**************************** ******************************  ****************
 FLOW PROCESS FROM NODE     885.00 TO NODE     885.00 IS CODE =    1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STRE.  VALUES<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTTION(MIN.)     6.42
 RAINFALL INTENSITY(INCH/HR) =    4.93
 TOTAL STREAM AREA(ACRES) =     3.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.41

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1       19.89     34.11         1.680         19.68
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    2       10.41     6.42        4.931          3.52

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1       14.16      6.42        4.931
     2       23.44     34.11        1.680

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        23.44   Tc(MIN.) =   34.11
 TOT. AREA(ACRES) =         23.20
 LONGEST FLOWPATH FROM NODE    881.00 TO NODE    885.00    9217.00 FEET.

****************************************************************    ********
 FLOW PROCESS FROM NODE    885.00 TO NODE    893.00 IS CODE =  81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.680
 *USER SPECIFIED(SUBAREA):
 OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT    .6000
  -  · · CURE NUMBER  (AMC II) =
 .ilRSA-P.VERAGE RUNOF? COEFFICIENT = 0.5010
 SUB:,,rtEA AREA(ACRES)       5.67   SUDh..REA RUi OFF( C.S)        .72
 TOTAL P.REA(ACRES)        28.87   TOT_::.,RUNOFF(CFS) =   29.15
 TC(MIN.) =  34.11

**********************************************  **************  **************
 FLOW PROCESS FROM NODE    893.00 TO NODE    915.00 IS CODE =  11

 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<


 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF    Tc       INTENSITY      AREA
 NUMBER      (CFS)   (MIN.)    (INCH/HOUR)   (ACRE)
     1       29.15    34.11       1.680        28.87
 LONGEST FLOWPATH FROM NODE    881.00 TO NODE    915.00    9217.00 FEET.

 ** MEMORY BANK # 3 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)   (ACRE)
     1       10.94     6.04        5.131         2.29
 LONGEST FLOWPATH FROM NODE    901.00 TO NODE    915.00    1015.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)      (MIN.)    (INCH/HOUR)
     1       16.10       6.04        5.131
     2       32.73      34.11        1.680

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS)        32.73   Tc(MIN.) =   34.11
 TOTAL AREA(ACRES) =        31.16
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  FLOW PROCESS FROM NODE    915.00 TO NODE    915.00 IS CODE =  12

  >>>>>CLEAR MEMORY BANK # 3 <<<<<


****************************************************************************
  FLOW PROCESS FROM NODE    915.00 TO NODE    916.00 IS CODE =  31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIM... TED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   454.00  DOWNSTREAM(FEET)     430.00
  FLOW LENGTH(FEET)     365.00  M...  ING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.6 INCHES
  PIPE-FLOW  VELOCITY(FEET/SEC.)     18.40
  ESTIMATSD PIPE DIAMETER (nJCE)     21.00    ITUMGER OF PIPES      1
  PIPE-FLOW (CFS)       32.73
  PIPE TP..AVEL TIME (MIN.)     0.33    Tc (MIN.) =  34.44
  LmJGEST FLQ\JPATH FROcl NODS     881.00 TO NODE    916.00    9582.CO  FEET.

********** ********** ********** ********** ********** ******
  FLOW  PROCESS  FROM  NODE    915.00  TO  NODE    916.00 IS  CODE  =  81

  >>>>>ZWDITION OF SUBJlREA TO ii!CINLIHE PEZ\.K FLO\i<<<<<

    50 YEAR R!;_INFALL INTENSITY(INCH/HOUP..)     1.670
  *USER SPECIFIED (SUBAREP.):
  PERENNIAL GRASS FAIR COVER RUNOFF COEFFICIENT    .6000
  S.C.S. CURVE NUMBER (AMC II)     0
  AREA-AVERAGE RUNOFF COEFFICIENT  = 0.6218
  SUBAREA AREA(ACRES)       1.74   SUBAREA RUNOFF(CFS)       1.74
  TOTAL AREA(ACRES)        32.90   TOTAL RUNOFF(CFS)      34.16
  TC(MIN.) =  34.44

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  END OF RATIONAL METHOD ANALYSIS
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HYDROLOG; c ODEL
Ultimate

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          RATIONAL METHOD HYDROLOGY COMPUTER PROGRJI  PACKAGE
          Reference; SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                     2003,1985,1981 H"fDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. l.5A Release Date: 01/01/2003  License ID 1239

                          Analysis prepared by:

                     HUNSAKER & ASSOCIATES - SAN DIEGO
                          10179 Huennekens Street
                            San Diego, Ca. 92121
                              (858) 558-4500

 ************************** DESCRIPTION OF STUDY **************************
  * Otay Ranch Village 7 (Construction Change- Santa Luna SD)               *
  * 50-Year Hydrologic Model, ULTIMATE SCENARIO                             *
* W.O. 25-349                                                              *
 **************************************************************************

  FILE NAHE; H:\AES2003\0025\349\RG\V7 G50CU .DAT
  TIME/DATE OF STUDY: 14:49 04/26/2006

  USER SPECIFIED EYDROLOGY AND i1YDRAULIC MODEL INFORiU:..TIOH:

  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR)     50.00
  6-HOUR DURATION PRECIPITATION (INCHES) ; 2.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) ; 18.00
  SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE ;0.95
  SAN DIEGO HYDROLOGY MANUJlL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOWZI,ND STREETFLOW MODEL*
     HALF-  CROWN  TO   STREET-CROSSFALL:   CURB   GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL   IN-   / OUT-/PARK-  HEIGHT  HOTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)    SIDE / SIDE/ WAY     (FT)     (FT)  (FT)   (FT)     (n)
             =========   =================   ======
  1   17.0      8.5    0.020/0.020/0.020    0.50     1.50 0.0313 0.125 0.0160
  2   29.0     14.5    0.020/0.020/0.020    0.50     1.50 0.0313 0.125 0.0130

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth ; 0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint ; 5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


**************** ***************************************  *****************
  FLOW PROCESS FROM NODE     851.50 TO NODE     851.50 IS CODE ;  7

  :0:>::.::.USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
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 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  10.00   RAIN INTENSITY(INCH/HOUR)    3.71
 TOTAL AREA(ACRES)  =     5.00   TOTAL RUNOFF(CFS)  =    164.00

****************************************************************************
 FLOW PROCESS FROM NODE    851.50 TO NODE    852.50 IS CODE =  31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING  COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =   532.00  DOWNSTREAM(FEET)      493.00
 FLOW LENGTH(FEET) =   684.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)    26.02
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =    164.00
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  10.44
 LONGEST FLOWPATH FROM NODS    321.00 TO NODS    852.50    6697.CC !"EET.

****************************************************************************
 FLOW PROCESS FROM NODE    852.50 TO NODE    852.50 IS CODE =   1

 >>>>>DESIGNF>_TE IND2PEi.JDENT S'l'REAM FOR CONFLUSJCE<<«<
==========================================  ==========  =  ========================
 TOTAL NUMBER OF STRE.'l-.MS =  3
 COlffLUENCE VALUES USED i'0R ii.iDEPElJDEi,iT S 1i'E.:--.    .i  -  ,i.:
 TIME OF CONCENTRATION(MIN.)    10.44
 RAINFALL INTENSITY(INCH/HR) =   3.61
 TOTAL STREAM Jl.REA(ACRES) =     5.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    164.00

************************************   ************************************
 FLOW PROCESS FROM NODE    861.00 TO NODE    862.00 IS CODE =  21

 >>>>>RATIONAL METHOD  INITIAL  SUBAREA ANALYSIS<<<< <

 *USER SPECIFIED(SUBAREA):
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER  (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    95.00
 UPSTREAM ELEVATION(FEET) =    537.00
 DOWNSTREAM ELEVATION(FEET)=    532.50
 ELEVATION DIFFERENCE(FEET) =      4.50
 SUBl\REA OVERLAND TIME OF FLOW(MIN.) =    2.075
 'ilARNING:  INITIAL  SUBAREA  FLOW  PATH  LENGTH  IS  GREATER  THAN
          THE MAXIMUM  OVERLAND  FLOW  LENGTH  =    93.68
          (Reference: Table 3-lB of Hydrology Manual)
          THE MAXIMUM  OVERLAND  FLOW  LENGTH  IS  USED  IN  Tc  CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS)       0.68
 TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.68

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 FLOW PROCESS FROM NODE    862.00 TO NODE    863.00 IS CODE =  61

 >>>>>COMPUTE STREET FLOW  TRAVEL  TIME  THRU  SUBAREA<<<<<
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 >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
 UPSTREAM ELEVATION(FEET) =  532.00  DOWNSTREAM ELEVATION(FEET)    498.00
 STREET LENGTH(FEET) =   577.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET)  =  17.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)     8.50
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)    0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
 STREET PARKWAY CROSSFALL(DECIMAL)    0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS)         2.03
   STREETFLOW MODEL RESULTS USING ESTIM..TED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.18
   AVERAGE FLOW VELOCITY(FEET/SEC.)      4.07
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      1.02
 STREET FLOW TRAVEL TIME(MIN.) =  2.36   Tc (MIN.)    4.44
   50 YE.R P....0-IJFP⊥LL INTEtJSIT"I(INCH/HOUR)    5.195
 NOTE: P..AINF?l.LL INTENSITY IS BASED ON Tc = 5-MHPJTE.
 *USER SPECIFIED(SUB_REA;
;::1cnBORl-iOOD COfviMERCIJ⊥ RUHOFF CG:C:?FICIENT = .sooo
 S.C.S. CURVE NUMBER  (AMC II) =   0
 AREA -11.VERAGE RUNOFF COEFFICIENT    0.900
 SUB:o.REA 11..REA(ACRES)       0.52      SUB!l.REA RU1IO??(CFS) =     ?.,.
 TOTAL AREA(ACRES)  =       0.65         PEAK FLOi RATE(CFS)          3.39

 END OF SUBAREA STREET FLOW HYDP..AULICS:
 DEPTH(FEET) =  0.28   HALFSTREET FLOOD WIDTH(FEET)     7.93
 FLOW VELOCITY(FEET/SEC.)=  4.54   DEPTH*VELOCITY(FT*FT/SEC.)     1.29
 LONGEST FLOWPATH FROM NODE    861.00 TO NODE    863.00 =   672.00 FEET.

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 FLOW PROCESS FROM NODE     863.00 TO NODE     852.50 IS CODE =    1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

 TOTAL NUMBER OF STREAMS  =  3
 CONFLUENCE V..UES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.)     4.44
 RAINFALL INTENSITY(INCH/HR) =   5.80
 TOTAL STREAM AREA(ACRES) =     0.65
 PEAK FLO\'i RATE(CFS) AT CONFLUENCE =      3.39

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 FLOW PROCESS FROM NODE    866.00 TO NODE    867.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT =  .9000
 S.C.S. CURVE NUMBER  (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   146.00
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 UPSTREAM ELEVATION(FEET) =     537.00
 DOWNSTREAM ELEVATION(FEET)      532.50
 ELEVATION DIFFERENCE(FEET)        4.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =     2.286
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =     85.41
          (Reference: Table 3-lB of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS)        0.73
 TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.73

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 FLOW PROCESS FROM NODE     867.00 TO NODE     868.00 IS CODE =  61

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<

 UPSTREA.M ELEVATION(FEET) =  532.00  DOWNSTREAM ELEVATION(FEET)    497.00
 STREET LENGTH(FEET) =    531.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.00

 DIST!\JCE FROM CROWN TO C?.OSSFALL GRJ'..DEBRE:C,.I<(FEET)       8.50
 IKSIDE STREET CROSSFALL(DE".:Ifil.z'L)     0.020
 OUTSIDE STREET CROSSF;-_LL(DECViL,.;,.,)       0.020

 SPECIFIED :'\UMBER OF HJ'.LFSTREETS C>RP.':'ING P.ill!OFF
 STRSET P.  I<\\!AY  CROSSF::LL {DSCiiL.L)
 Manning's FRICTION FACTOR for Streetflow section(curb-to-curb)      0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.24
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =     6.45
   AVERAGE FLOW VELOCITY(FEET/SEC.)      4.20
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      1.07
 STREET FLOW TRAVEL TIME(MIN.) =   2.31   Tc(MIN.)     4.59
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     5.796
 NOTE: RJlNFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT     0.900
 SUBAREA AREA(ACRES)      0.58      SUBAREA RUNOFF(CFS) =     3.03
 TOTAL AREA(P.CRES) =      0.72        PEAK FLOW RATE(CFS)         3.76

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) =  0.29   HALFSTREET FLOOD WIDTH(FEET)     8.25
 FLOW VELOCITY(FEET/SEC.) =  4.70   DEPTH*VELOCITY(FT*FT/SEC.)     1.37
 LONGEST FLOWPATH FROM NODE     866.00 TO NODE     868.00 =    727.00 FEET.

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 FLOW PROCESS FROM NODE     868.00 TO NODE     852.50 IS CODE =    1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
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>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
TIME OF CONCENTRATION(MIN.)     4.59
RAINFALL INTENSITY(INCH/HR) =    5.80
TOTAL STREAM AREA(ACRES) =     0.72
PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.76

** CONFLUENCE DATA **
STREAM     RUNOFF       Tc       INTENSITY       AREA
NUMBER      (CFS)     (MIN.)   (INCH/HOUR)     (ACRE)
    1      164.00     10.44        3.606          5.00
    2        3.39      4.44        5.796          0.65
    3        3.76      4.59        5.796          0.72

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  3 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF       Tc       INTENSITY
NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
    1       76.72      4.44        5.796
    2       79.29      4.59        5.796
    3      178.45     10.44        3.506

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS)      158.40:   Tc(MIN.) =    10.44
TOTAL AREA(ACRES) =      6.37
LONGEST FLOWPATH FROM NODE    321.00 TO NODE    852.50    6697.00 FEET.

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FLOW PROCESS FROM NODE     852.50 TO NODE     864.00 IS CODE =  31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) =   493.00  DOWNSTREAM( FEET)     492.00
FLOW  LENGTH(FEET) =     23.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.)        23.73
ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES    1
PIPE-FLOW(CFS) =     168.45
PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  10.45
LONGEST FLOWPATH FROM NODE    321.00 TO NODE     864.00    6720.00 FEET.

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FLOW PROCESS FROM NODE     864.00 TO NODE     864.00 IS CODE =    1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.)     10.45
RAINFALL INTENSITY(INCH/HR) =    3.60
TOTAL STREAM AREA(ACRES) =      6.37
PEAK FLOW RATE(CFS) AT CONFLUENCE =     168.45
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 FLOW PROCESS FROM NODE    870.00 TO NODE    871.00 IS CODE =  21
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 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 RESIDENTAIL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =  0
 INITIAL SUBl:\.REA FLOW-LENGTH(FEET) =  75.00
 UPSTREAM ELEVATION(FEET) =  520.00
 DOWNSTREAM ELEVATION(FEET) =  519.25
 ELEVATION DIFFERENCE(FEET) =  0.75
 SUBAREA OVERLAND TIME OF FLOW (MIN.) =  5.271
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =  70.00
          (Reference: Table 3-lB of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOVI LEUGTH IS USED IN Tc C-L".:ULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.602
 SUBAREA RUNOFF(CFS)  1.39
 TOTAL AREA(ACRES) =  0.33  TOTAL RUNOFF (CFS)  1.39

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 FLOl'l PROCESS FROM NODE  872..00 TO NODE  872.00 IS CODE =  61

 >>>>>COMPUTE STREET FLOl'l TRAVEL TIME THRU SUBP…REA<<<<<
 >>>>> (STANDARD CURB SECTION USED)<<<<<

 UPSTREP•JH ELEVALION(FEET: =  518.CC  DG}JiTSTE2 J1 ELE\7_r._T:c11(FE:T) ..:. 15.Cl
 STREET LENGTH(FEET) =  1300.00  CURB rtEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) =  16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)  8.00
 INSIDE STREET CROSSFALL(DECIMAL)  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  0.020

 SPECIFIED NUMBER OF HALFSTREETS Cl:\.RRYING RUNOFF  1
 STREET PARKWAY CROSSFALL(DECIMAL)  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)  0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section  0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)  30.97
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.68
  HALFSTREET FLOOD WIDTH(FEET) =  24.76
  AVERAGE FLOW VELOCITY(FEET/SEC.)  2.18
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)  1.47
 STREET FLOW TRAVEL TIME(MIN.) =  9.95  Tc(MIN.)  15.22
  50 YEAR RAINFALL INTENSITY(INCH/HOUR)  2.827
 *USER SPECIFIED(SUBAREA):
 RESIDENTAIL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT  .7500
 S.C.S. CURVE NUMBER (AMC II) =  0
 AREA-AVERAGE RUNOFF COEFFICIENT  0.750
 SUBAREA AREA(ACRES)  26.41  SUBAREA RUNOFF(CFS) =  56.01
 TOTAL AREA(ACRES) =  26.74  PEAK FLOW RATE(CFS)  56.71
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  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.83   HALFSTREET FLOOD WIDTH(FEET)    32.26
  FLOW VELOCITY(FEET/SEC.) =  2.49   DEPTH*VELOCITY(FT*FT/SEC.)     2.05
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1300.0 FT WITH ELEVATION-DROP =   3.0 FT, IS  106.6 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    872.00
  LONGEST FLOWPATH FROM NODE    870.00 TO NODE    872.00 =  1375.00 FEET.

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  >>>>>COMPUTE PIPE-FLO\ TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM(FEET) =   493.00  DOWNSTREAM(FEET)     492.00
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.9 lNCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)     10.S2
  ESTIMATED  PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =      56.71
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  15.34
  LONGEST FLOWPATH FROM NODE    870.00 TO NODE    864.00    1457.00 FEET.

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  FLOW PROCESS FROM NODE     864.00 TO NODE    864.00 IS CODE =    ■

  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>.ll1'ID CQr.CPUTE V.D-IOTJS COTF:!:JUElTCSD ST!'1.E-'-JJ ".iAL'ES<<<<<

  TOTAL NUNBER OF STREAJiS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.)    15.34
  RAINFALL INTENSITY(INCH/HR) =   2.81
  TOTAL STREAM l\REA(ACRES) =    26.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     56.71

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      168.45    10.45        3.602          6.37
      2       56.71    15.34        2.813         26.74

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
      1      207.09    10.45        3.602
      2      188.23    15.34        2.813

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS)      207.09   Tc(MIN.) =   10.45
  TOTAL AREA(ACRES) =      33.11
  LONGEST FLOWPATH FROM NODE    321.00 TO NODE    864.00    6720.00 FEET.

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 FLOW PROCESS FROM NODE     864.00 TO NODE     904.00 IS CODE =   31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) =    492.00  DOWNSTREAM(FEET)     455.00
 FLOW LENGTH(FEET) =    906.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.)        24.29
 ESTIMATED PIPE DIAMETER(INCH) =   45.00    NUMBER OF PIPES     1
 PIPE-FLOW(CFS) =     207.09
 PIPE TRAVEL TIME(MIN.) =    0.62    Tc(MIN.) =  11.08
 LONGEST FLOWPATH FROM NODE     321.00 TO NODE     904.00     7626.00 FEET.

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 FLOW PROCESS FROM NODE     904.00 TO NODE     904.00 IS CODE =    ■

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM   1 ARE:
 TIME OF CONCENTR..TION(MIN.)     11.08
 RAINFALL INTENSITY(INCH/HR) =    3.47
 TOTAL STREAM A..EA(ACRES) =     33.11
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     207.C?

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 FLO'.l?ROCESS FROM NODE     9C1.00 TJ NODE     9C:.OO$ OC: =      21

 >>>>>RATIONAL METHOD INITIAL SUBZ\REA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 NEIGHBORHOOD  COMMERCIAL RUNOFF COEFFICIENT =  .9000
 S.C.S. CURVE NUMBER (AMC II) =    0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =     95.00
 UPSTREAM ELEVATION(FEET) =     497.00
 DOWNSTREAM ELEVATION(FEET)=     492.25
 ELEVATION  DIFFERENCE(FEET) =       4.75
 SUBAREA OVERLZ\ND TIME OF FLOW(MIN.) =     2.052
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)    5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS)         0.52
 TOTAL  AREA(ACRES)  =       0.10   TOTAL  RUNOFF(CFS)  =       0.52

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 FLOW PROCESS FROM NODE     902.00 TO NODE     903.00 IS CODE =   61

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<

 UPSTREAM ELEVATION(FEET) =  490.00   DOWNSTREAM  ELEVATION(FEET)    460.00
 STREET LENGTH(FEET) =    800.00    CURB HEIGHT(INCHES) =   6.0
 STREET IW..LFWIDTH(FEET) =  17.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)      8.50
 INSIDE STREET CROSSFALL(DECIMAL)     0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)      0.020
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 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)     0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section     0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)         2.70
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =     7.93
   AVERAGE FLOW VELOCITY(FEET/SEC.)       3.62
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)      1.03
 STREET FLOW TRAVEL TIME(MIN.) =   3.68   Tc(MIN.)     5.73
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     5.308
 *USER SPECIFIED(SUBAREA):
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT =  .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT     0.900
 SUBAREA AREA(ACRES)       0.91      SUBAREA RUNOFF(CFS) =     4.35
 TOTAL AREA(ACRES) =       1.01        PEAK FLOW RATE(CFS)         4.83

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET)     10.26
 FLOW VELOCITY(FEET/SEC.) =  4.12   DEPTH*VELOCITY(FT*FT/SEC.)       1.37
 LONGEST FLOWPATH FROM NODE     901.00 TO rODE     902.JJ =    393.0:; FEET.

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 FLO\J P?-OCESS FROM NODE     ?03.00 TO lJOCE     90..; .JC S COD:: =

 >>>>>DESIGNATE INDEPE1'IDENT STREP-J1 FOR CONFLUENCE<<<<<

 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2.IiRE:
 TIME OF CONCENTRATION(MIN.)      5.73
 RAINFALL INTENSITY(INCH/HR) =    5.31
 TOTAL STREAM AREA(ACRES) =      1.01
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.83

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 FLOW PROCESS FROM NODE     911.00 TO NODE     912.00 IS CODE =  21

 >>>>>RATIONAL METHOD INITI.li-L SUBAREA ANALYSIS<<<<<

 *USER SPECIFIED(SUBAREA):
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT =  .9000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =     95.00
 UPSTREAM ELEVATION(FEET) =     498.00
 DOWNSTREAM ELEVATION(FEET) =     493.25
 ELEVATION DIFFERENCE(FEET) =       4.75
 SUBAREA OVERLANTI TIME OF FLOW(MIN.) =     2.052
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     5.796
 NOTE: R.. INFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS)         0.57
 TOTAL AREA(ACRES) =       0.11   TOTAL RUNOFF(CFS) =       0.57

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 FLOW PROCESS FROM NODE     912.00 TO NODE     913.00 IS CODE =   61

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<

 UPSTREAM ELEVATION(FEET) =   490.00   DOWNSTREAM ELEVATION(FEET)    460.00
 STREET LENGTH(FEET) =    780.00    CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) =  17.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET)      8.50
 INSIDE STREET CROSSFALL(DECIMAL)    0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)     0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF     1
 STREET PARKWAY CROSSFALL(DECIMAL)      0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb)     0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section      0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)          3.49
   STREETFLOW MODEL RESULTS USING ESTIM".TED FLO\v:
   STREET FLOW DEPTH(FEET) =  0.30
   HALFSTREET FLOOD WIDTH(FEET) =     8.87
   AVERAGE FLOW VELOCITY(FEET/SEC.)       3.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.)       1.17
 STREET FLOW TRAVEL TIME(MIN.) =    2.2-:     Tc (NiiJ.}
   50 YEAR RAINFALL INTENSITY(INCH/HOUR)     5.500
 *USER SPECIFIED(SUBAREA):
 !EIGHEOP..HOO:J ::0[•1ViERCihL r..\IJCF? COE?FICIZrT
 S.C.S. CURVE NUMBER(.MC II) =       0
 AREA-AVERAGE RUNOFF COEFFICIENT     0.900
 SUBAREA  AREA(ACRES)       1.1       SUB.REA RUNOFF(CFS) =     5.79
 TOTAL AREA(ACRES) =        7           PEAK FLOrJ RATE(CFS)          6.34
                            1.28

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET)     11.46
 FLOW VELOCITY(FEET/SEC.) =  4.43    DEPTH*VELOCITY(FT*FT/SEC. )      1.57
 LONGEST FLOWPATH FROM NODE     911.00 TO NODE     913.00 =    875.00 FEET.

****************************************   ************************************
 FLOW PROCESS FROM NODE     913.00 TO NODE     904.00 IS CODE =    1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AlVD COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

 TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR IIDEPENDENT STREAM   3 ARE:
 TIME OF CONCENTRATION(MIN.)      5.42
 RAINFALL INTENSITY(INCH/HR)      5.50
 TOTAL STREAM AREA(ACRES) =      1.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.34

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.     (INCH/HOUR)     (ACRE)
     1       207.09    11.08         3.470          33.11
     2         4.83     5.73         5.308           1.01
     3         6.34     5.42         5.500           1.28
```

```
  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1       141.57      5.42        5.500
      2       146.33      5.73        5.308
      3       214.24     11.08        3.470

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE (CFS)       214.24    Tc(MIN.) =    11.08
  TOTAL AREA(ACRES) =        35.40
  LONGEST FLOWPATH FROM NODE     321.00 TO NODE     904.00     7626.00 FEET.

************************************  ******************* *****************
  FLOW PROCESS FROM NODE     904.00 TO NODE     915.00 IS CODE =   31

  >>>>>COMPUTE PIPE-FLO\'/ TRAVEL TIME THRU SUBARK11..<<<<<
  >>>>>USING COMPUTER-ESTIlATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

  ELEVATION DATA: UPSTREAM (FEET) =    455.00  oo;NSTREAM (FEET)     ,\5-±.00
  FLOW LENGTH(FEET) =    120.00   M\l!NING'S N =    0.013
  DEPTH OF FLOW IN  50.0  UCH PIPE IS  45.5  INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        13.40
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    tnJMBER OF PIPES     1
  PIPE-FLOW(CFS) =   14.24
  PIPE TRAVEL TIME(MIN.) =    0.15     Tc(MIN.) =   11.23
  LONGEST FLOWPATH FROM NODE     321.00 TO NODE     915.00     7746.00 FEET.

******************* ******************************  *************************
  FLOW PROCESS FROM NODE     915.00 TO NODE     916.00 IS CODE =   31

  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBA.REA<<<<<
  >>>>>USING COMPUTER-ESTIMATED  PIPESIZE  (NON-PRESSURE  FLOW)<<<<<

  ELEVATION  DATA: UPSTREAM(FEET) =    454.00   DOWNSTREAM(FEET)      430.00
  FLOW  LENGTH(FEET) =    365.00    MANNING'S N  =   0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.)        29.35
  ESTIMATED  PIPE DIAMETER(INCH) =  42.00     NUMBER OF PIPES     1
  PIPE-FLOW(CFS) =     214.24
  PIPE TRAVEL TIME(MIN.) =    0.21     Tc(MIN.) =   11.43
  LONGEST FLOWPATH FROM NODE     321.00 TO NODE     916.00     8111.00 FEET.

***************  ***********************************************************
  FLOW PROCESS FROM NODE     915.00 TO NODE     916.00 IS CODE =   81

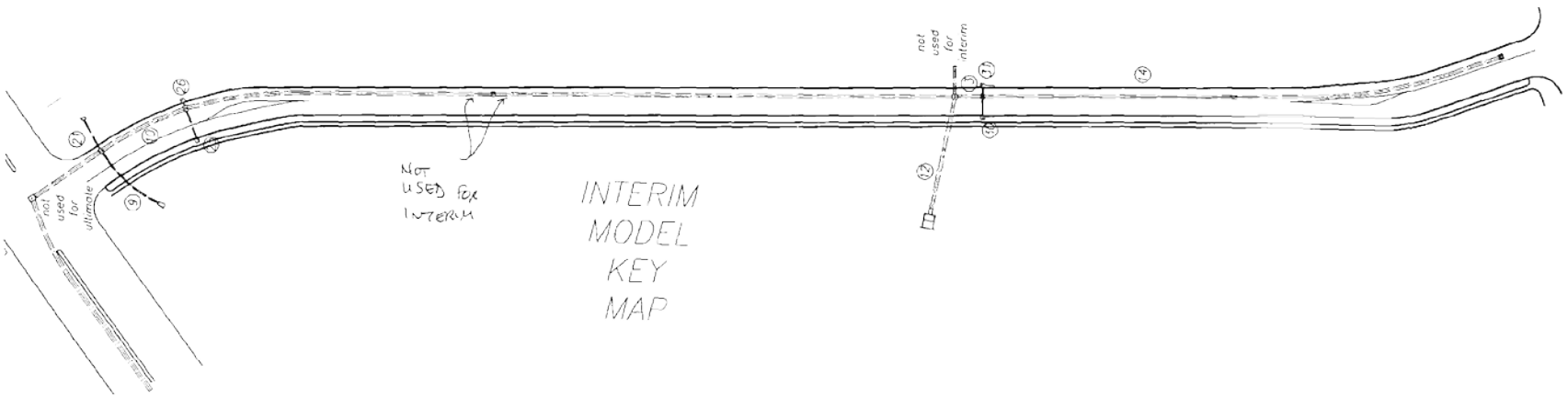
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======  =========  =======  =====  ======  ==========  ======================  ========
    50 YEAR RAINFZl.LL INTENSITY(INCH/HOUR) =   3.400
  *USER SPECIFIED(SUBAREA):
  PERENNIAL GRASS FAIR COVER RUNOFF COEFFICIENT =  .6000
  S.C.S. CURVE NUMBER (AMC II) =    0
  AREA-AVERAGE RUNOFF COEFFICIENT =  1.8480
  SUBAREA AREA (ACRES)       1.74    SUBAREA RUNOFF(CFS)       3.55
```

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  TOTAL AREA(ACRES)        37.14   TOTAL RUNOFF(CFS)    233.37
  TC(MIN.)    11.43

================================================   ======================  ==
  END OF RATIONAL METHOD ANALYSIS
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HYDRAULIC MODEL
Interim

RE ctc H\REPO?.Tsc-02sc:;. g.;;iB.dcc
w.o.C025-3...e ..JO':OC-5 11:-..:.,11



INTERIM MODEL KEY MAP

PROJECT' O!:"IY R."..!''CH VILL.7 STO?J1 FILE ,Q025\349\RG\L NEH60I
DSS GN!::R' rle

CD	L2	MAX 0	flDJ 0	LENGTH	FL	FL 2	CTL/Ti'I	D	W	S	KJ	KE	KM	LC	Ll	L3	L<:	Al	A3	A.	J	N
							44S.40															
	9	32.7	32.7	90.10	4H.50	.J.16.99	0.00	24.	0.		0.50	0.00	0.05	▮	10	21	0	90.	0.	0.	4.00	0.013
2	10	10.9	10.9	106.98	447.32	-::48.50	0.00	24.	0.		0 50	0.00	0.05	0	11	26	0	90	90.	o.	4.00	0.013
	11	6.3	6.3	35.25	448.56	448.91	0 .00	18.	0.		0.00	0.20	0.05	0	0	0	0	0	0.	0.	.00	0.013
	21	29 2	29.2	39.12	447.80	456.32	0.00	18.	0.		0.DO	0.20	0.05	10			0	0.	0.	0.	.00	0.013
	26	.8	.8	5.25	HS.56	450.66	0.00	18.	0.		0.00	0.20	0.05	▮▮	0	0	0	0.	0.	0.	00	0.023

PROJ!::CT: OT"-Y RII..NC:t V LL.7 STORM "'EE:0025\3.;9\RG\L!N!::H50!
DES!G:-JER: rle

LINE NO	Q (CFS)	D (IN)	W (IN)	DN (FT)	DC (FT)	FLOW TYP	SF-FlJLL (FT/FT)	v FPS}	V 2 (FPS!	FL 1 (FT)	FL 2 (FT)	HG CALC	EG 2 C."1.C	D (FT)	D 2 (FT.:	Ti'l CALC	TW CK	REMARKS
	HYDRAULIC GR."-OE LIN£ CONTROL 448.40																	
	32.7	24		2.00	.aS	P."'.RT	0.02089	15.	26.,	446.50	46.99	44/.78	447.82	.28	0.83	0.00	0.00	
10	10.9	24		0.94	I.18	PF-JiT	0.00232	7.5	5.	447.32	448.56	448.26	449.74	0.9.;	1.18	0.00	0.00	
	X =	.ao	X(N")		22.44													
11	6.3	IE	0	0.84	0.97	FULL	0.00360	3.5	.o	448.56	418.91	450.77	450.90	2.21	1.99	451.1-l	0.00	
10	HYDR.OlJLIC GRADE LINE CONTROL 4 8 04																	
21	29.2	18	0	0.83	1.50	PART	0.07727	2Ll	16.5	447.80	456.32	448.77	457 82	0.97	SO	462 91	0.0a	
11	HYDRAULIC GRADE LINE CONTROL 450. 26																	
26	4.8	18	0	0.27	0.84	SEAL	0.00209	2.7	L7	448.56	450 65	450 25	451.50	.70	0 84	451.31	0.00	H'iD ,uMP
	X =	0.29	X(N) =	0.00	X(J) =	0.29	F(J)	1.88	o:!lJ)	0.42	D(>J)	1.57						

V 1, FL 1, D 1 AND HG RE:!'ER TO D01'1NSTREi'"t END

V 2, FL 2, D AND HG RE:FER TO UPSTR:OAM END

X DISTJ>.NCE IN FE:ET FROM DOi'INSTREAM END TO PCINT W!'!E:R!': HG INTERSECTS SOFF!T IN SE.!\.L CONDITION

X (N) DISTI\.NCE IN FE:ET FROM oo;INST?.Ei'M END TO POINT \•IHERE t1AT::R SURFACE REACH::s NORNAL DEPTH 3Y SITHER DRAHDOIIN OR 90.CKIA':'E:R

X (J) DIST.ZU.SCS IN FEET FROM DO·INSTRS. M E1'.1U TO POINT W:iER£ HDR..il.ULIC .TI.IMP OCCl.8.S IN LINE

F(J) THE COMPUTED FORCE AT TH:: P.YD!l.AULIC JI11P

D (BJ) DEPT!! OF \•!ATER 3EFDRE TC!": HYDRAULIC JlJI1P (UPSTREM SIDE)

D(AJ) DEPTH OF W;>TER AFTER THE HYDR.!\.ULIC JUMP (DOWNSTRE.I\I-'. SIDE)

SEAL INDICATES ?LO\/ Cf.'ANGES FROM PART TO FULL OR FROM FULL TO P;>. T

HYO JUMP INDiw\TES THl>.T FLOW CHANGES FROM SUPERCRITICAL TO SU3CRITICAL THROUGH A HYDR\\UL.IC JUMP

HJ @ UJT INDICATES THAT HYDR•ULIC JUMP OCCURS AT THE JUNCTION AT THE UPSTRE."<M END OF TH:O LINE

HJ @ DJT INDICATES THAT HYDR!>.UL!C JUMP OCCURS AT THE JUNCTION AT THE DOWNSTRE;>J>t £ND OF THE LINE

EOJ 5/ 2/2006 15'43

Worksheet for STARTING WSEL-LINE H ult60

Project Description

Friction Method	Manning Fonnula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	1.59000	%
Diameter	60.00	in
Discharge	214.20	ft'/s

Results

Normal Depth	2.94	ft
Flow Area	12.02	ft'
Wetted Perimeter	8.74	ft
Top Widlh	4.92	ft
Critical Depth	4.16	ft
Percent Full	58.9	%
Critical Slope	0.00659	ft/ft
Velocity	17.82	ft/s
Velocity Head	4.93	ft
Specific Energy	7.88	ft
Froude Number	2.01	
Maximum Discharge	353.25	ft'/s
Discharge Full	328.39	ft'/s
Slope Full	0.00676	ft/ft
Flow Type	SuperCritical	

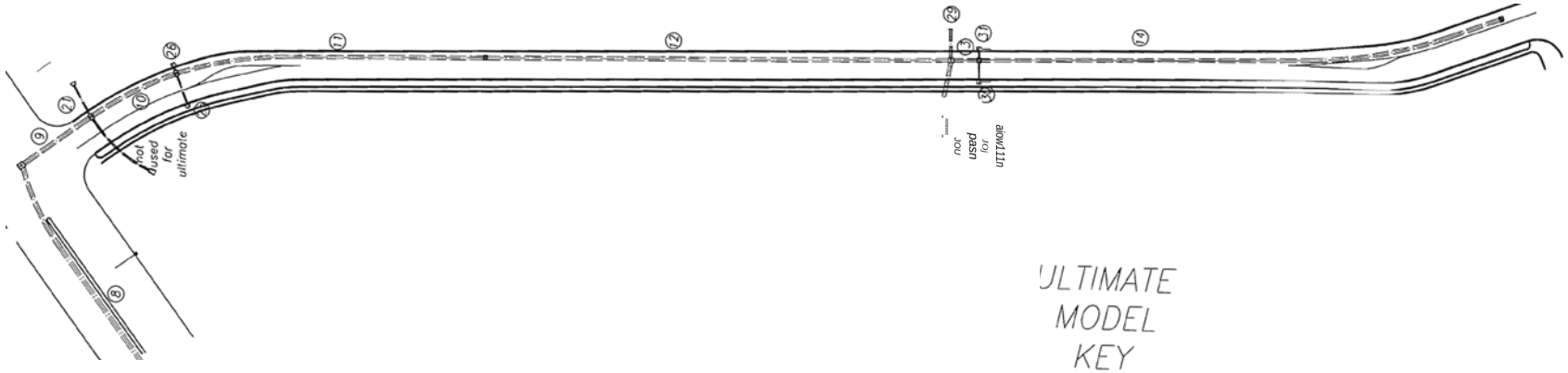
GVF Input Data

Downstream Depth	0.00	ft
Length	0 00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Nonnal Depth Over Rise	58.86	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

HYDRAULIC MODEL
Ultimate



ULTIMATE MODEL KEY MAP

PROJECT' OTAY RANC!i VILL.7 **STORM FILE: 0025\349\RG\LINEH60U**
DES!GNER, rle

CD	L2	iLl\X Q	.MJJ Q	LENGT'1	FL	FL 2	CTL/T\ I	D	S	KJ	KE	KM	LC	Ll	L3	L4	Al	A3	J	N
							441.94													
		214.2	214.2	266.35	438.50	442 73	0.00	60.	0.	0 50	0.00	0.05		9		**0**	**43.**	0.	0.	6.00 0.013
	9	214.2	214.2	**93.41**	**443.06**	**44 .oo**	o.oo	60.	o.	0.50	0.00	0.05		10	0	0	O.	O.	0.	4.00 0.013
2	10	214.2	214.2	106.93	444.33	;;5.06	o.oo	60.	O.	0.50	o.oo	0.05	0	11	26	25	0.	90.	90.	.oo 0.013
2	11	207.l	207.1	360.30	445.56	449.49	0.00	54.	0.	0.50	0.00	0.05	0	12		0	0	O.	O.	.00 0.013
	12	207.	207.l	538 63	449 99	472 82	0.00	48.	0.	0.50	o.oo	0.05		13	29		0.	90.	0.	5.00 0.013
	13	168.5	168.5	28.00	73.15	484.35	O.OO	48.	0.	a.so	o.oo	o.o5		14	31	30	0.	90.	90.	.oo 0.0 3
2	**14**	**164.0**	**164.0**	**553.15**	**484.68**	**513.91**	0.00	48.	0.	0.50	0.00	0.05	0	0	0	0	0.	0.	0.	5.00 O.O!J
	25	6.	6.3	**35.25**	**448.56**	**48.91**	0.00	18.	0.	0.00	0.20	o.os	**11**	0				0	0	1.00 0.013
	25	.8	.3	**s 2s**	**48 s6**	**=o 66**	o.oo	18.	O.	0.00	0.20	0.05	11	0		0	O.	0.	0.	.oo 0.013
2	23	**56.7**		34.00	473.82	482.70	0.00	36.	0.	0.00	0.20	0.05	13				O.	0.	0.	1.00 0.013
2	30	3.4	3.4.	20.75	486.85	490.70	o.oo	18.	0.	0.00	0.20	0.05	**14**	0		0	O.	0.	0.	1.00 0.013
2	**31**	3.3	3.3	8.75	486.85	490.35	0 00	16.	O	0.00	0 20	0.05		0		O	0.	O.	0.	1.00 0.013

PROJECT: OTAY RL>..NCH VILL.7 STORN FILE,0025\349\RG\LINEH60U
DESIGNER: rle

LINE NO	Q (CFS)	D (IN}	\-1 (IN:'	DN (FT)	DC (fT)	FL0!-1 TYPE	SF FU- L (:;"!f!'T)	V ▮ {FPS}	V 2 (FPS)	FL l {FT}	FL 2 (FT)	CAlC	HG 2 CALC	D l (!'T)	D 2 (!'T)	Ti-i CALC	rn; CK	REMARKS
	HYDRAULIC GRE_DE LHIE CONTROL 4.;1.94																	
	214.2	60		2.95	4.16	PART	0.00676	14.9	12.3	438.50	42.73	1.9	446.89		4.16	0.00	0.00	
	21..;.2	60		3.C5	4.16	FULL	0.00676	10.9	10.9	443.06	444.00	C48.52	145.17	s.:;6	5.17	0.00	0.00	:JJ @ IJJT
10	214 2	60	0	c.08	.16	PA..T	0.00576	14.5	16.1	444.33	45.06	447.03	448.26	3.50	3.20	0.00	0.00	
11	207.	54		4.50	4.08	PART	0 01105	17.2	26.5	45.56	49.49	48.7	451.71	3.18	2.22	0.00	0.00	
12	207.1	48		2.47	3.86	PART	0.02078	25.6	28.6	449 99	472.82	452.45	475.06	2.46	2.24	0.00	0.00	
13	168.	48	0	1.16	3.72	PART	0.01376	35.5	25.9	473.15	484.35	474.76	86. 0	1 61	2 05	0.00	0.00	
14	164.0	48	0	1.99	J.69	PP.RT	0.01303	25.3	13.	484.68	513.91	486.67	517.60	1.99	3.69	520.45	0.00	
11	HYDRAULI C GRADE LINE CONTROL																	
25	5.3	18	0	0.8	0.97	PA.T	0.00360	6.1	5.2	48.56	48.91	49.l	449.88	0.85	0.97	450.39	0.00	
11	HYDRAULIC GRADS LINE CONTROL H·S.50																	
26	4.8	19		0.27	0.84	PART	0.00209	12.4	-L7	8.56	450.60	49.97	451.SO		0.0,;	451.91	0.00	
12	HYDRAULIC GRADE LWE CONTROL •74.91																	
29	56.7	36	0	0.82	2.44	PART	0.00723	2	S.2	473.S2	482.70	474.91	485.14	.09	.44	486.72	0.00	
	HYDRPliLIC GRP.DE LINE CONTROL 485.54																	
30	3.4	18		0.28	0.70	".RT	0.00105	13.7	.2	486.85	490.70	487.15	431.40	O.Π	0.70	491.73	0.00	

PROJECTo OTAY R_C,NCH VILL. 7 STORM FIL.E'0025\349\RG\L.INEHoOU
DESIGNER : rle

LINE NO	Q (CFS)	D (IN)	W (IN)	DN (FT)	D::: (FT)	FLOW	SF-FULL (FT/FT)	V ▮ (FPS)	V 2 (F?S;	FL 1 (FT)	FL 2 (FT)	HG 1 Ci'.LC	HG 2 C."..LC	D l (FT)	D 2 (FT)	TW Ci'.LC	'IW CK	R.SMP..P.KS
		HOR_C,ULIC GE<ADE LNE CONTROL					486.54											
31	3.B	18	0	0.24	0.74	PART	0.00131	13.o	4.3	486.85	490.35	487.17	491.09	0.32	O.H	491 45	0.00	

V 1, FL 1, D AND HG REFER TO OOWNSTREAN END

V 2, FL 2, D P.ND HG 2 RS:FER TO UPSTRSPH E""D

X **W!STANC=: IN FE=.:T FROM DOWNSTREP.l·l END TO PO INT \•lHERE HG Il'ITERSECTS SOFFIT IN ss. .L CONDITION**

X(N) DIST.'<NCE IN FEST FROM D011NSTRE.>c'l END TO POHIT WHERE W.'.TER SURFACE REACHES NORMAL DEPTH 3Y E ITHER DR.'.v/DO\•IN CR BACKl·/J>.TER

X(J) DIST.1\.:'.ICE IN FEET FROM DOl·INSTRE.1\...l END TO POINT WHERE HYDoV\.ULI C Jl.DIP OCCURS IN LI:-JE

? (J) THE COMPUTED FORCE fɑI' THE HYDP !\ULIC JlJ11P

D (BJ i DEPTH OF \-/ATER BEFORE ')';IE HYDRAULIC JUMP (UPSTREAI'I', SI DE)

D (AJ) DEPTH OF HATER AFTER THE HYDRAULIC **.ɹuHP** (DOWNSTREAM SIDE)

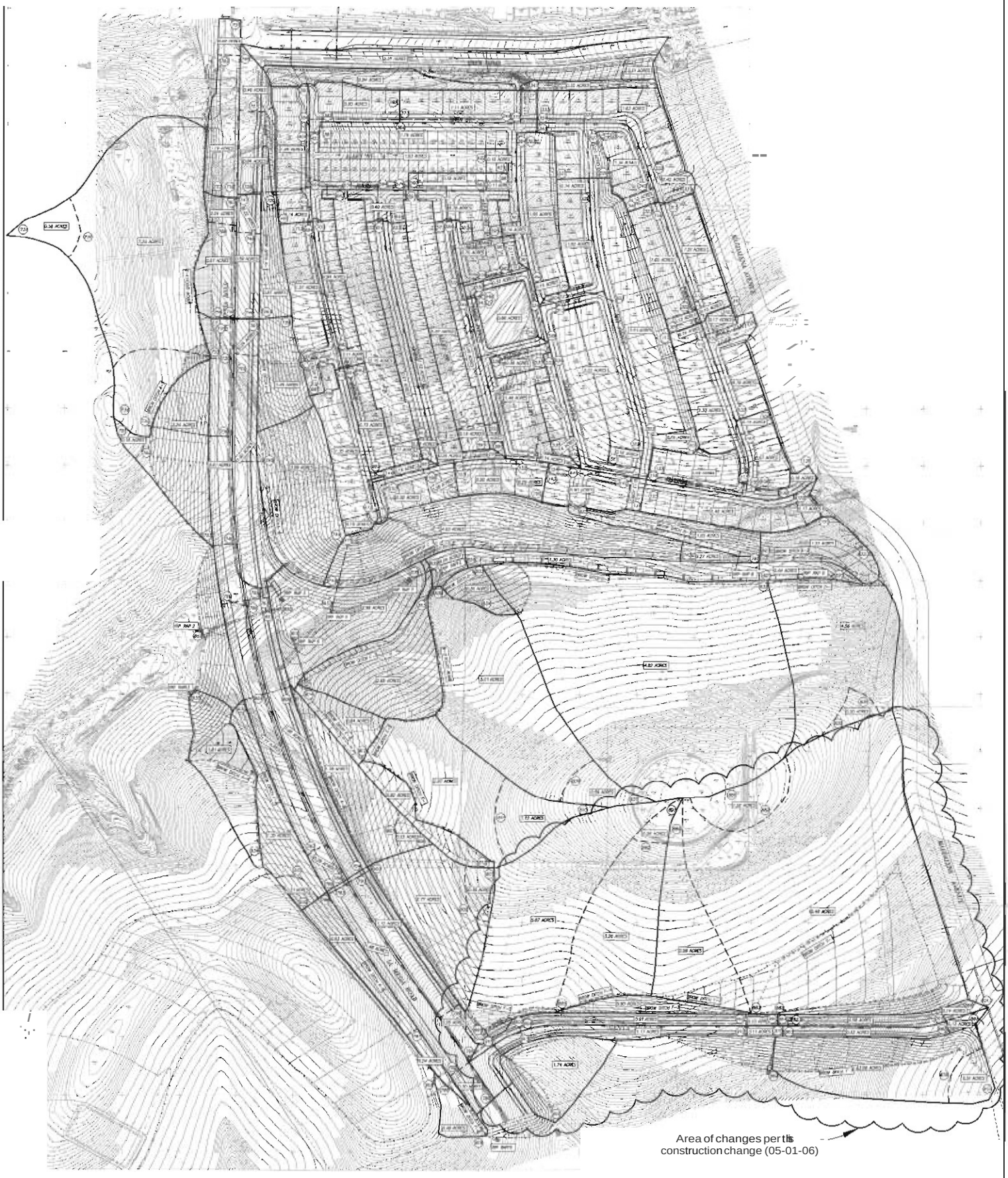
SEAL INDICI>.TES FLOW CH.•IGES FROM P.1\.:.≤T TO FULL OR FROM ?ULL TO P.'L'<T

HYD JUM? INDI C.1'TES TIL'<T FLOW CH.i\.NGES ?ROM SU!'ERCRITIC!'.L TO SUBC:UTIC!'.L THROUGH :< HYDRAULIC JUMP

HJ *'11* UJT INDICATES TH>,.T HYDRAU:;..IC JUM!' OCCURS AT THE JUNCTION J:;T THE UPSTREAM END OF THE LINE

HJ *'11* DJT INDICJ>:TES THAT HYDP-''-DLIC JlJI·l!' OCCURS AT THE JUNCTION J:;T T!-iE DOl·iNSTREAM END OF THE LINE

EOJ 5/ 2/2005 25,.n



LEGEND

SCALE 1"= 100'

PREPARED FOR:
1111 HUNSAKER
Im -A.:ms

ROUGH GRADING HYDROLOGY MAP FOR
OTAY RANCH, VILLAGE 7
CITY OF CHULA VISTA, CALIFORNIA

SHI:f"t
OF
2