```
Sub-Area C Value = 0.786
Initial subarea total flow distance  =  522.000(Ft.)
Highest elevation =  402.000(Ft.)
Lowest elevation =  395.000(Ft.)
Elevation difference =    7.000(Ft.) Slope =  1.341 %
Bottom of Initial Area Slope adjusted by User to  2.440 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.34 %, in a development type of
 Neighborhod Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.97 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7860)*(  60.000^.5)/(   1.341^(1/3)]=   3.97
The initial area total distance of  522.00 (Ft.) entered leaves a
remaining distance of  462.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.67 minutes
for a distance of 462.00 (Ft.) and a slope of  2.44 %
with an elevation difference of  11.27(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.675 Minutes
Tt=[(11.9*0.0875^3)/( 11.27)]^.385=  3.67
Total initial area Ti =   3.97 minutes from Figure 3-3 formula plus
  3.67 minutes from the Figure 3-4 formula =   7.64 minutes
Rainfall intensity (I) =      7.012(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.786
Subarea runoff =      7.716(CFS)
Total initial stream area =        1.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       89.200 to Point/Station       68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   390.000(Ft.)
Downstream point/station elevation =   389.500(Ft.)
Pipe length =     7.78(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     7.716(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     7.716(CFS)
Normal flow depth in pipe =    6.39(In.)
Flow top width inside pipe =   21.22(In.)
Critical Depth =   11.86(In.)
Pipe flow velocity =     11.49(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     7.66 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       89.200 to Point/Station       68.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.400(Ac.)
Runoff from this stream =      7.716(CFS)
Time of concentration =    7.66 min.
Rainfall intensity =     7.006(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       22.642     16.36           4.292
2        7.716      7.66           7.006
Qmax(1) =
           1.000 *    1.000 *    22.642) +
           0.613 *    1.000 *     7.716) + =      27.370
Qmax(2) =
           1.000 *    0.468 *    22.642) +
           1.000 *    1.000 *     7.716) + =      18.311

Total of 2 main streams to confluence:
Flow rates before confluence point:
     22.642       7.716
Maximum flow rates at confluence using above data:
      27.370       18.311
Area of streams before confluence:
       7.640        1.400


Results of confluence:
Total flow rate =     27.370(CFS)
Time of concentration =    16.362 min.
Effective stream area after confluence  =      9.040(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       68.000 to Point/Station       69.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   389.500(Ft.)
Downstream point/station elevation =   379.000(Ft.)
Pipe length =    98.03(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =    27.370(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =    27.370(CFS)
Normal flow depth in pipe =   10.95(In.)
Flow top width inside pipe =   23.91(In.)
Critical Depth =   21.79(In.)
Pipe flow velocity =     19.61(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    16.45 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       69.000 to Point/Station       90.200
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =   379.000(Ft.)
Downstream point elevation =   374.000(Ft.)
Channel length thru subarea  =   354.500(Ft.)
Channel base width           =   10.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
```

```
Estimated mean flow rate at midpoint of channel =     27.406(CFS)
Manning's 'N'    = 0.220
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =     27.406(CFS)
Depth of flow =   1.835(Ft.), Average velocity =   0.964(Ft/s)
Channel flow top width =   21.007(Ft.)
Flow Velocity =    0.96(Ft/s)
Travel time  =    6.13 min.
Time of concentration =   22.58 min.
Critical depth =      0.578(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.200 given for subarea
The area added to the existing stream causes a
a lower flow rate of Q =      6.571(CFS)
therefore the upstream flow rate of Q =     27.370(CFS) is being used
Rainfall intensity =      3.488(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.200  CA =      1.884
Subarea runoff =      0.000(CFS) for      0.380(Ac.)
Total runoff =     27.370(CFS)    Total area =       9.420(Ac.)
Depth of flow =   1.833(Ft.), Average velocity =   0.963(Ft/s)
Critical depth =      0.578(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       69.000 to Point/Station       90.200
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.420(Ac.)
Runoff from this stream =     27.370(CFS)
Time of concentration =   22.58 min.
Rainfall intensity =     3.488(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       91.100 to Point/Station       90.200
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[Street and Roads]
(Paved)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =  507.140(Ft.)
Highest elevation =  396.000(Ft.)
Lowest elevation =  374.000(Ft.)
Elevation difference =   22.000(Ft.) Slope =  4.338 %
Top of Initial Area Slope adjusted by User to  2.430 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   2.43 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.58 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  70.000^.5)/(   2.430^(1/3)]=   2.58
The initial area total distance of  507.14 (Ft.) entered leaves a
remaining distance of  437.14 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.82 minutes
for a distance of 437.14 (Ft.) and a slope of  4.34 %
with an elevation difference of  18.96(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.822 Minutes
Tt=[(11.9*0.0828^3)/( 18.96)]^.385=  2.82
Total initial area Ti =   2.58 minutes from Figure 3-3 formula plus
  2.82 minutes from the Figure 3-4 formula =   5.40 minutes
Rainfall intensity (I) =      8.777(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      3.436(CFS)
Total initial stream area =       0.450(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       91.100 to Point/Station       90.200
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.450(Ac.)
Runoff from this stream =      3.436(CFS)
Time of concentration =    5.40 min.
Rainfall intensity =     8.777(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       27.370     22.58           3.488
2        3.436      5.40           8.777
Qmax(1) =
           1.000 *    1.000 *    27.370) +
           0.397 *    1.000 *     3.436) + =      28.736
Qmax(2) =
           1.000 *    0.239 *    27.370) +
           1.000 *    1.000 *     3.436) + =       9.980

Total of 2 main streams to confluence:
Flow rates before confluence point:
      27.370       3.436
Maximum flow rates at confluence using above data:
       28.736       9.980
Area of streams before confluence:
        9.420       0.450


Results of confluence:
Total flow rate =     28.736(CFS)
Time of concentration =    22.577 min.
Effective stream area after confluence  =      9.870(Ac.)
End of computations, total study area =          9.870 (Ac.)
```

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                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/13/12
--------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 4
--------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
--------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       92.100 to Point/Station       92.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.710
Initial subarea total flow distance  =  533.840(Ft.)
Highest elevation =  396.000(Ft.)
Lowest elevation =  387.000(Ft.)
Elevation difference =    9.000(Ft.) Slope =  1.686 %
Top of Initial Area Slope adjusted by User to  3.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 90.00 (Ft)
for the top area slope value of   3.00 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.62 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7100)*(  90.000^.5)/(   3.000^(1/3)]=   4.62
The initial area total distance of  533.84 (Ft.) entered leaves a
remaining distance of  443.84 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.02 minutes
for a distance of 443.84 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.44(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.023 Minutes
Tt=[(11.9*0.0841^3)/(  4.44)]^.385=  5.02
Total initial area Ti =   4.62 minutes from Figure 3-3 formula plus
  5.02 minutes from the Figure 3-4 formula =   9.64 minutes
Rainfall intensity (I) =      6.038(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.710
Subarea runoff =      6.173(CFS)
Total initial stream area =        1.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       92.200 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   382.000(Ft.)
Downstream point/station elevation =   381.500(Ft.)
Pipe length =    28.18(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     6.173(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     6.173(CFS)
Normal flow depth in pipe =    7.94(In.)
Flow top width inside pipe =   22.58(In.)
Critical Depth =   10.56(In.)
Pipe flow velocity =      6.80(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     9.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       92.200 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.440(Ac.)
Runoff from this stream =      6.173(CFS)
Time of concentration =    9.71 min.
Rainfall intensity =     6.010(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       93.100 to Point/Station       93.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.710
Initial subarea total flow distance  =  820.600(Ft.)
Highest elevation =  404.000(Ft.)
Lowest elevation =  387.000(Ft.)
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Elevation difference =   17.000(Ft.) Slope =  2.072 %
Top of Initial Area Slope adjusted by User to  2.300 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   2.30 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.61 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7100)*(  75.000^.5)/(   2.300^(1/3)]=   4.61
The initial area total distance of  820.60 (Ft.) entered leaves a
remaining distance of  745.60 (Ft.)
Using Figure 3-4, the travel time for this distance is   7.49 minutes
for a distance of 745.60 (Ft.) and a slope of  1.00 %
with an elevation difference of   7.46(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    7.489 Minutes
Tt=[(11.9*0.1412^3)/(  7.46)]^.385=  7.49
Total initial area Ti =   4.61 minutes from Figure 3-3 formula plus
  7.49 minutes from the Figure 3-4 formula =  12.09 minutes
Rainfall intensity (I) =      5.216(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.710
Subarea runoff =      5.926(CFS)
Total initial stream area =        1.600(Ac.)


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Process from Point/Station       93.200 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   382.000(Ft.)
Downstream point/station elevation =   381.500(Ft.)
Pipe length =     9.91(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     5.926(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     5.926(CFS)
Normal flow depth in pipe =    5.95(In.)
Flow top width inside pipe =   20.72(In.)
Critical Depth =   10.33(In.)
Pipe flow velocity =      9.77(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.11 min.


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Process from Point/Station       93.200 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.600(Ac.)
Runoff from this stream =      5.926(CFS)
Time of concentration =   12.11 min.
Rainfall intensity =     5.212(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        6.173      9.71           6.010
2        5.926     12.11           5.212
Qmax(1) =
           1.000 *    1.000 *     6.173) +
           1.000 *    0.802 *     5.926) + =      10.924
Qmax(2) =
           0.867 *    1.000 *     6.173) +
           1.000 *    1.000 *     5.926) + =      11.279

Total of 2 main streams to confluence:
Flow rates before confluence point:
      6.173       5.926
Maximum flow rates at confluence using above data:
     10.924      11.279
Area of streams before confluence:
      1.440       1.600


Results of confluence:
Total flow rate =     11.279(CFS)
Time of concentration =    12.112 min.
Effective stream area after confluence  =      3.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       71.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   381.500(Ft.)
Downstream point/station elevation =   377.000(Ft.)
Pipe length =    77.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =    11.279(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =    11.279(CFS)
Normal flow depth in pipe =    7.99(In.)
Flow top width inside pipe =   22.62(In.)
Critical Depth =   14.46(In.)
Pipe flow velocity =     12.32(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    12.22 min.
End of computations, total study area =          3.040 (Ac.)
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       San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/13/12
--------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 4
--------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
--------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       90.200 to Point/Station       72.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.400
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space    )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.290
Initial subarea total flow distance  =  403.500(Ft.)
Highest elevation =  374.000(Ft.)
Lowest elevation =  372.000(Ft.)
Elevation difference =    2.000(Ft.) Slope =  0.496 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.50 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =  13.02 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2900)*(  50.000^.5)/(   0.496^(1/3)]=  13.02
The initial area total distance of  403.50 (Ft.) entered leaves a
remaining distance of  353.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.52 minutes
for a distance of 353.50 (Ft.) and a slope of  0.50 %
with an elevation difference of   1.75(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.522 Minutes
Tt=[(11.9*0.0670^3)/(  1.75)]^.385=  5.52

Total initial area Ti =  13.02 minutes from Figure 3-3 formula plus
  5.52 minutes from the Figure 3-4 formula =  18.55 minutes
Rainfall intensity (I) =      3.959(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.290
Subarea runoff =      1.286(CFS)
Total initial stream area =       1.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       90.200 to Point/Station       72.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.120(Ac.)
Runoff from this stream =      1.286(CFS)
Time of concentration =   18.55 min.
Rainfall intensity =     3.959(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       90.200 to Point/Station       72.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.280
Decimal fraction soil group C = 0.510
Decimal fraction soil group D = 0.210
[MEDIUM DENSITY RESIDENTIAL                 ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.480
Rainfall intensity (I) =      3.488(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  22.58 min.  Rain intensity =       3.49(In/Hr)
Total area =       9.870(Ac.)  Total runoff =    28.736(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       90.200 to Point/Station       72.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.870(Ac.)
Runoff from this stream =     28.736(CFS)
Time of concentration =   22.58 min.
Rainfall intensity =     3.488(In/Hr)
Program is now starting with Main Stream No. 3
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       71.000 to Point/Station       72.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less       )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.710
Rainfall intensity (I) =      5.182(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  12.22 min.  Rain intensity =       5.18(In/Hr)
Total area =        3.040(Ac.)  Total runoff =    11.279(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       71.000 to Point/Station       72.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      3.040(Ac.)
Runoff from this stream =     11.279(CFS)
Time of concentration =   12.22 min.
Rainfall intensity =     5.182(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        1.286     18.55           3.959
2       28.736     22.58           3.488
3       11.279     12.22           5.182
Qmax(1) =
            1.000 *    1.000 *     1.286) +
            1.000 *    0.821 *    28.736) +
            0.764 *    1.000 *    11.279) + =      33.509
Qmax(2) =
            0.881 *    1.000 *     1.286) +
            1.000 *    1.000 *    28.736) +
            0.673 *    1.000 *    11.279) + =      37.460
Qmax(3) =
            1.000 *    0.659 *     1.286) +
            1.000 *    0.541 *    28.736) +
            1.000 *    1.000 *    11.279) + =      27.680

Total of 3 main streams to confluence:
Flow rates before confluence point:
       1.286      28.736      11.279
Maximum flow rates at confluence using above data:
       33.509      37.460      27.680
Area of streams before confluence:
        1.120       9.870       3.040

Results of confluence:
Total flow rate =      37.460(CFS)
Time of concentration =     22.577 min.
Effective stream area after confluence  =      14.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.000 to Point/Station       72.000
**** 6 HOUR HYDROGRAPH ****
------------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

Time of Concentration =  22.58
Basin Area =    14.03 Acres
6 Hour Rainfall =  3.500 Inches
Runoff Coefficient =  0.515
Peak Discharge =    37.46 CFS
     Time (Min)      Discharge (CFS)
       0                0.000
       22               1.491
       44               1.620
       66               1.697
       88               1.882
       110              1.996
       132              2.288
       154              2.480
       176              3.032
       198              3.453
       220              5.070
       242              7.144
       264             37.460
       286              4.067
       308              2.721
       330              2.129
       352              1.783
       374              1.552
```

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\

==========
JOB TITLE
==========

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: **NODE 72**
5508rpl4 - Detention Pond - BMP 4

S/N:
PondPack Ver: Compute Time: Date:

Table of Contents

Table of Contents (continued)

S/N:
PondPack Ver: Compute Time: Date:

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
DETENTION 4 IN	POND	100	106991		264.00	37.46		
DETENTION 4 OUT	POND	100	99589	R	279.00	15.09	375.77	72952
HYD 4	HYG	100	107038	R	264.00	37.46		
*OUT 4 - N82	JCT	100	99589	R	279.00	15.09		

S/N:
PondPack Ver: Compute Time: Date:

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
DETENTION 4 IN	POND	106991		264.00	37.46	
DETENTION 4 OUT	POND	99589	R	279.00	15.09	375.77
HYD 4	HYG	107038	R	264.00	37.46	
Outfall OUT 4 - N82	JCT	99589	R	279.00	15.09	

S/N:
PondPack Ver: Compute Time: Date:

HYG file =
HYG ID = HYG 4
HYG Tag = N-72

Peak Discharge =	37.46 cfs
Time to Peak =	264.00 min
HYG Volume =	107038 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 22.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	1.49	1.62	1.70	1.88
110.00	2.00	2.29	2.48	3.03	3.45
220.00	5.07	7.14	37.46	4.07	2.72
330.00	2.13	1.78	1.55		

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
373.00	-----	21200	0	0	0
374.00	-----	24750	68856	22952	22952
376.00	-----	32700	85899	57266	80218
378.00	-----	42250	112120	74746	154964

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 373.00 ft
Increment = .50 ft
Max. Elev.= 378.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Orifice-Circular	O0	--->	CV	375.000	378.000
Stand Pipe	RP	--->	CV	375.750	378.000
Orifice-Circular	O1	--->	CV	373.000	378.000
Culvert-Circular	CV	--->	TW	363.000	378.000

TW SETUP, DS Channel

S/N:
PondPack Ver: Compute Time: Date:

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID	= O0	
Structure Type	= Orifice-Circular	
# of Openings	=	8
Invert Elev.	=	375.00 ft
Diameter	=	1.0000 ft
Orifice Coeff.	=	.600

Structure ID	= RP	
Structure Type	= Stand Pipe	
# of Openings	=	1
Invert Elev.	=	375.75 ft
Diameter	=	4.0000 ft
Orifice Area	=	12.5664 sq.ft
Orifice Coeff.	=	.600
Weir Length	=	12.57 ft
Weir Coeff.	=	3.100
K, Reverse	=	1.000
Mannings n	=	.0000
Kev,Charged Riser	=	.000
Weir Submergence	= No	

Structure ID	= O1	
Structure Type	= Orifice-Circular	
# of Openings	=	4
Invert Elev.	=	373.00 ft
Diameter	=	.2080 ft
Orifice Coeff.	=	.600

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID	=	CV	
Structure Type	=	Culvert-Circular	
No. Barrels	=	1	
Barrel Diameter	=	3.0000	ft
Upstream Invert	=	363.00	ft
Dnstream Invert	=	355.01	ft
Horiz. Length	=	184.84	ft
Barrel Length	=	185.01	ft
Barrel Slope	=	.04323	ft/ft

OUTLET CONTROL DATA...

Mannings n	=	.0130	
Ke	=	.5000	(forward entrance loss)
Kb	=	.007228	(per ft of full flow)
Kr	=	.5000	(reverse entrance loss)
HW Convergence	=	.001	+/- ft

INLET CONTROL DATA...

Equation form	=	1	
Inlet Control K	=	.0078	
Inlet Control M	=	2.0000	
Inlet Control c	=	.03790	
Inlet Control Y	=	.6900	
T1 ratio (HW/D)	=	1.114	
T2 ratio (HW/D)	=	1.275	
Slope Factor	=	-.500	

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control, interpolate between flows at T1 & T2...
At T1 Elev = 366.34 ft ---> Flow = 42.85 cfs
At T2 Elev = 366.82 ft ---> Flow = 48.97 cfs

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = TW
Structure Type = TW SETUP, DS Channel

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID: Chn-Cir - 1

CONVERGENCE TOLERANCES...
Maximum Iterations= 40
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .00 cfs
Max. Q tolerance = .00 cfs

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Circular
Channel ID: Chn-Cir - 1

Solution to Mannings Open Channel Flow Equation
(Computed values are based on normal depth.)

CIRCULAR CROSS SECTION

Slope = .005200 ft/ft
Mannings n = 0.01300
Invert Elev. = 353.91 ft
Top of Channel = 359.41 ft
Diameter = 5.5000 ft

Name.... DETENTION 4
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\5508RPL4-100 YR-BMP 4.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\
Inflow HYG file = NONE STORED - DETENTION 4 IN 100
Outflow HYG file = NONE STORED - DETENTION 4 OUT 100

Pond Node Data = DETENTION 4
Pond Volume Data = DETENTION 4
Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

Starting WS Elev	=	373.00 ft
Starting Volume	=	0 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
373.00	.00	0	21200	.00	.00	.00
373.50	.41	11032	22941	.05	.46	368.21
374.00	.62	22952	24750	.06	.68	765.74
374.50	.77	35795	26634	.06	.83	1194.00
375.00	.90	49597	28587	.07	.97	1654.21
375.50	7.11	64394	30609	.07	7.18	2153.63
375.75	13.75	72175	31646	.07	13.82	2419.65
376.00	27.38	80218	32700	.08	27.46	2701.38
376.50	56.74	97133	34973	.08	56.82	3294.58
377.00	92.70	115204	37322	.09	92.78	3932.90
377.50	119.61	134468	39748	.09	119.70	4601.96
378.00	124.66	154964	42250	.10	124.76	5290.22

S/N:
PondPack Ver: Compute Time: Date:

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\
Inflow HYG file = NONE STORED - DETENTION 4 IN 100
Outflow HYG file = NONE STORED - DETENTION 4 OUT 100

Pond Node Data = DETENTION 4
Pond Volume Data = DETENTION 4
Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

Starting WS Elev	=	373.00 ft
Starting Volume	=	0 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	1.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	37.46 cfs	at	264.00 min
Peak Outflow	=	15.09 cfs	at	279.00 min
Peak Infiltration	=	.07 cfs	at	279.00 min
Peak Elevation	=	375.77 ft		
Peak Storage	=	72952 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	0
+ HYG Vol IN	=	106991
- Infiltration	=	5477
- HYG Vol OUT	=	99589
- Retained Vol	=	1863
Unrouted Vol	=	-62 cu.ft (.058% of Inflow Volume)

WARNING: Outflow hydrograph truncated on right side.

DETENTION TIMES SUMMARY

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP 4\
Inflow HYG file = NONE STORED - DETENTION 4 IN 100
Outflow HYG file = NONE STORED - DETENTION 4 OUT 100

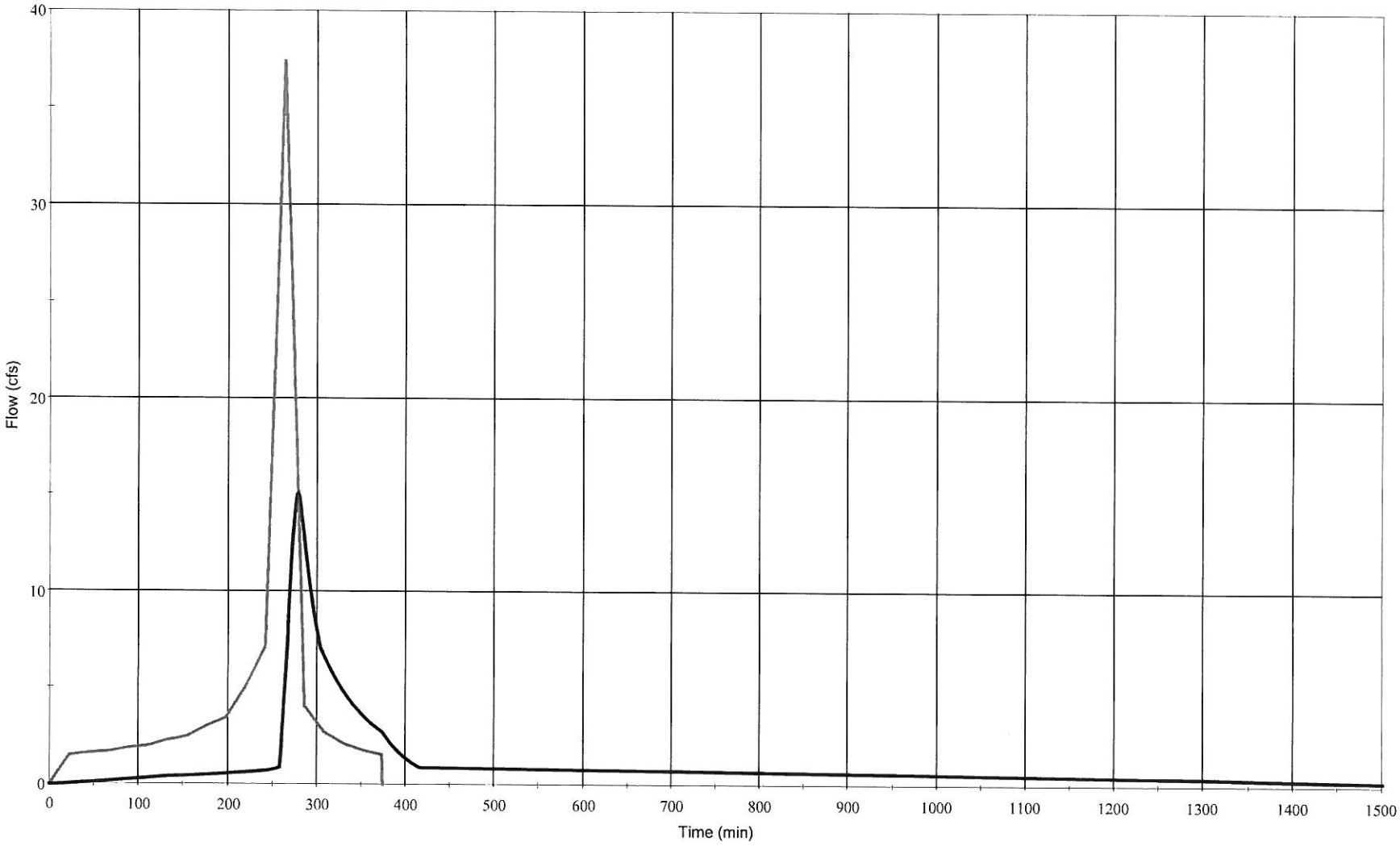
Pond Node Data = DETENTION 4
Pond Volume Data = DETENTION 4
Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

APPROXIMATE DETENTION TIME

Tp, Outflow + Infilt.	=	279.00 min
Tp, Total Inflow	=	264.00 min
Peak to Peak	=	15.00 min
Qout+Infilt. Centroid	=	593.64 min
Inflow Centroid	=	232.43 min
Centroid to Centroid	=	361.22 min
Weighted Avg. Plug Time	=	393.59 min
Max.Plug Vol. Plug Time	=	329.15 min
Max.Inflow Plug Volume	=	2206 cu.ft (From 263.00 to 264.00 min)

NODE 72 - DETENTION POND - BMP 4
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT



Bio-Retention Pond-5

100-year Development Conditions

```
        San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/12/12
--------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 5
--------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
--------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.100 to Point/Station       46.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                 ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.453
Initial subarea total flow distance  =  881.700(Ft.)
Highest elevation =  402.000(Ft.)
Lowest elevation =  378.000(Ft.)
Elevation difference =   24.000(Ft.) Slope =  2.722 %
Top of Initial Area Slope adjusted by User to  4.000 %
Bottom of Initial Area Slope adjusted by User to  2.250 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   4.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.34 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4530)*( 100.000^.5)/(   4.000^(1/3)]=   7.34
The initial area total distance of  881.70 (Ft.) entered leaves a
remaining distance of  781.70 (Ft.)
Using Figure 3-4, the travel time for this distance is   5.68 minutes
for a distance of 781.70 (Ft.) and a slope of  2.25 %
with an elevation difference of  17.59(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    5.684 Minutes
Tt=[(11.9*0.1480^3)/( 17.59)]^.385=  5.68
Total initial area Ti =   7.34 minutes from Figure 3-3 formula plus
  5.68 minutes from the Figure 3-4 formula =  13.02 minutes
Rainfall intensity (I) =      4.974(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.453
Subarea runoff =      3.740(CFS)
Total initial stream area =        1.660(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.100 to Point/Station       46.200
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.660(Ac.)
Runoff from this stream =      3.740(CFS)
Time of concentration =   13.02 min.
Rainfall intensity =     4.974(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.100 to Point/Station       45.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.050
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.258
Initial subarea total flow distance  =  902.000(Ft.)
Highest elevation =  685.000(Ft.)
Lowest elevation =  381.000(Ft.)
Elevation difference =  304.000(Ft.) Slope = 33.703 %
Top of Initial Area Slope adjusted by User to 30.000 %
Bottom of Initial Area Slope adjusted by User to 30.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  30.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.88 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2575)*( 100.000^.5)/(  30.000^(1/3)]=   4.88
The initial area total distance of  902.00 (Ft.) entered leaves a
remaining distance of  802.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.14 minutes
for a distance of 802.00 (Ft.) and a slope of 30.00 %
with an elevation difference of 240.60(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.139 Minutes
Tt=[(11.9*0.1519^3)/(240.60)]^.385=  2.14
Total initial area Ti =   4.88 minutes from Figure 3-3 formula plus
```

```
  2.14 minutes from the Figure 3-4 formula =   7.02 minutes
Rainfall intensity (I) =      7.410(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.258
Subarea runoff =      9.406(CFS)
Total initial stream area =        4.930(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.200 to Point/Station       46.200
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   374.000(Ft.)
Downstream point/station elevation =   373.000(Ft.)
Pipe length =    24.55(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     9.406(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     9.406(CFS)
Normal flow depth in pipe =    7.96(In.)
Flow top width inside pipe =   22.60(In.)
Critical Depth =   13.14(In.)
Pipe flow velocity =     10.32(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.06 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.200 to Point/Station       46.200
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.930(Ac.)
Runoff from this stream =      9.406(CFS)
Time of concentration =    7.06 min.
Rainfall intensity =     7.383(In/Hr)
Summary of stream data:

Stream    Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1        3.740     13.02          4.974
2        9.406      7.06          7.383
Qmax(1) =
           1.000 *    1.000 *     3.740) +
           0.674 *    1.000 *     9.406) + =      10.078
Qmax(2) =
           1.000 *    0.542 *     3.740) +
           1.000 *    1.000 *     9.406) + =      11.434

Total of 2 main streams to confluence:
Flow rates before confluence point:
       3.740       9.406
Maximum flow rates at confluence using above data:
       10.078       11.434
Area of streams before confluence:
       1.660        4.930

Results of confluence:
Total flow rate =      11.434(CFS)
Time of concentration =     7.059 min.
Effective stream area after confluence  =      6.590(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.200 to Point/Station       39.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   373.000(Ft.)
Downstream point/station elevation =   372.500(Ft.)
Pipe length =    27.65(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =    11.434(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =    11.434(CFS)
Normal flow depth in pipe =   11.05(In.)
Flow top width inside pipe =   23.92(In.)
Critical Depth =   14.57(In.)
Pipe flow velocity =      8.09(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     7.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.200 to Point/Station       39.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.590(Ac.)
Runoff from this stream =     11.434(CFS)
Time of concentration =    7.12 min.
Rainfall intensity =     7.344(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       47.100 to Point/Station       47.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  607.200(Ft.)
Highest elevation =  392.000(Ft.)
Lowest elevation =  378.000(Ft.)
Elevation difference =   14.000(Ft.) Slope =  2.306 %
Top of Initial Area Slope adjusted by User to  2.790 %
Bottom of Initial Area Slope adjusted by User to  2.470 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
```

```
for the top area slope value of   2.79 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.10 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  95.000^.5)/(   2.790^(1/3)]=   8.10
The initial area total distance of  607.20 (Ft.) entered leaves a
remaining distance of  512.20 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.96 minutes
for a distance of 512.20 (Ft.) and a slope of  2.47 %
with an elevation difference of  12.65(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.960 Minutes
Tt=[(11.9*0.0970^3)/( 12.65)]^.385=  3.96
Total initial area Ti =   8.10 minutes from Figure 3-3 formula plus
  3.96 minutes from the Figure 3-4 formula =  12.06 minutes
Rainfall intensity (I) =      5.226(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      3.316(CFS)
Total initial stream area =        1.410(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       47.200 to Point/Station       39.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   373.000(Ft.)
Downstream point/station elevation =   372.500(Ft.)
Pipe length =     7.40(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     3.316(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     3.316(CFS)
Normal flow depth in pipe =    4.15(In.)
Flow top width inside pipe =   18.15(In.)
Critical Depth =    7.63(In.)
Pipe flow velocity =      9.14(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    12.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       47.200 to Point/Station       39.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.410(Ac.)
Runoff from this stream =      3.316(CFS)
Time of concentration =   12.07 min.
Rainfall intensity =     5.222(In/Hr)
Summary of stream data:

Stream    Flow rate       TC            Rainfall Intensity
 No.        (CFS)        (min)                 (In/Hr)


1        11.434       7.12           7.344
2         3.316      12.07           5.222

Qmax(1) =
          1.000 *     1.000 *    11.434) +
          1.000 *     0.589 *     3.316) + =      13.388
Qmax(2) =
          0.711 *     1.000 *    11.434) +
          1.000 *     1.000 *     3.316) + =      11.446

Total of 2 main streams to confluence:
Flow rates before confluence point:
     11.434       3.316
Maximum flow rates at confluence using above data:
      13.388       11.446
Area of streams before confluence:
       6.590        1.410


Results of confluence:
Total flow rate =     13.388(CFS)
Time of concentration =     7.116 min.
Effective stream area after confluence  =      8.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station       40.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   372.500(Ft.)
Downstream point/station elevation =   370.500(Ft.)
Pipe length =    91.91(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =    13.388(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =    13.388(CFS)
Normal flow depth in pipe =   11.47(In.)
Flow top width inside pipe =   23.98(In.)
Critical Depth =   15.81(In.)
Pipe flow velocity =      9.03(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =     7.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station       40.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.000(Ac.)
Runoff from this stream =     13.388(CFS)
Time of concentration =    7.29 min.
Rainfall intensity =     7.234(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       48.100 to Point/Station       48.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.400
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.478
Initial subarea total flow distance  =  340.280(Ft.)
Highest elevation =  386.000(Ft.)
Lowest elevation =  381.000(Ft.)
Elevation difference =    5.000(Ft.) Slope =  1.469 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  2.620 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.95 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4780)*(  80.000^.5)/(   2.000^(1/3)]=   7.95
The initial area total distance of  340.28 (Ft.) entered leaves a
remaining distance of  260.28 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.30 minutes
for a distance of 260.28 (Ft.) and a slope of  2.62 %
with an elevation difference of   6.82(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.298 Minutes
Tt=[(11.9*0.0493^3)/(  6.82)]^.385=  2.30
Total initial area Ti =   7.95 minutes from Figure 3-3 formula plus
  2.30 minutes from the Figure 3-4 formula =  10.25 minutes
Rainfall intensity (I) =      5.805(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.478
Subarea runoff =      3.580(CFS)
Total initial stream area =        1.290(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       48.200 to Point/Station       40.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =   376.000(Ft.)
Downstream point/station elevation =   370.500(Ft.)
Pipe length  =   130.72(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.580(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     3.580(CFS)
Normal flow depth in pipe =    4.84(In.)
Flow top width inside pipe =   19.26(In.)
Critical Depth =    7.93(In.)
Pipe flow velocity =      7.91(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    10.52 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       48.200 to Point/Station       40.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.290(Ac.)
Runoff from this stream =      3.580(CFS)
Time of concentration =   10.52 min.
Rainfall intensity =     5.707(In/Hr)
Summary of stream data:

Stream    Flow rate       TC            Rainfall Intensity
 No.        (CFS)        (min)                  (In/Hr)


1        13.388       7.29            7.234
2         3.580      10.52            5.707
Qmax(1) =
            1.000 *    1.000 *    13.388) +
            1.000 *    0.692 *     3.580) + =       15.867
Qmax(2) =
            0.789 *    1.000 *    13.388) +
            1.000 *    1.000 *     3.580) + =       14.142

Total of 2 main streams to confluence:
Flow rates before confluence point:
      13.388       3.580
Maximum flow rates at confluence using above data:
       15.867       14.142
Area of streams before confluence:
        8.000        1.290


Results of confluence:
Total flow rate =      15.867(CFS)
Time of concentration =      7.285 min.
Effective stream area after confluence  =       9.290(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       41.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =   370.500(Ft.)
Downstream point/station elevation =   367.500(Ft.)
Pipe length  =   321.84(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    15.867(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    15.867(CFS)
Normal flow depth in pipe =   16.80(In.)
Flow top width inside pipe =   21.99(In.)
Critical Depth =   17.23(In.)
Pipe flow velocity =      6.75(Ft/s)
Travel time through pipe =    0.79 min.
Time of concentration (TC) =     8.08 min.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       41.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.290(Ac.)
Runoff from this stream =     15.867(CFS)
Time of concentration =    8.08 min.
Rainfall intensity =     6.766(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       49.100 to Point/Station       49.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.700
[MEDIUM DENSITY RESIDENTIAL                 ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.499
Initial subarea total flow distance  =  714.500(Ft.)
Highest elevation =  382.000(Ft.)
Lowest elevation =  373.000(Ft.)
Elevation difference =    9.000(Ft.) Slope =  1.260 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.68 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4990)*(  80.000^.5)/(   2.000^(1/3)]=   7.68
The initial area total distance of  714.50 (Ft.) entered leaves a
remaining distance of  634.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   6.61 minutes
for a distance of 634.50 (Ft.) and a slope of  1.00 %
with an elevation difference of   6.34(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    6.614 Minutes
Tt=[(11.9*0.1202^3)/(  6.34)]^.385=  6.61
Total initial area Ti =   7.68 minutes from Figure 3-3 formula plus
  6.61 minutes from the Figure 3-4 formula =  14.29 minutes
Rainfall intensity (I) =      4.683(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.499
Subarea runoff =      5.025(CFS)
Total initial stream area =       2.150(Ac.)
```

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Process from Point/Station       49.200 to Point/Station       41.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =   368.000(Ft.)
Downstream point/station elevation =   367.500(Ft.)
Pipe length =    29.61(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     5.025(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     5.025(CFS)
Normal flow depth in pipe =    7.22(In.)
Flow top width inside pipe =   22.02(In.)
Critical Depth =    9.47(In.)
Pipe flow velocity =      6.31(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.37 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       49.200 to Point/Station       41.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.150(Ac.)
Runoff from this stream =      5.025(CFS)
Time of concentration =   14.37 min.
Rainfall intensity =     4.667(In/Hr)
Program is now starting with Main Stream No. 3

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.100 to Point/Station       50.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.400
[MEDIUM DENSITY RESIDENTIAL                 ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.478
Initial subarea total flow distance  =  462.000(Ft.)
Highest elevation =  381.000(Ft.)
Lowest elevation =  373.000(Ft.)
Elevation difference =    8.000(Ft.) Slope =  1.732 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.95 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4780)*(  80.000^.5)/(   2.000^(1/3)]=   7.95
The initial area total distance of  462.00 (Ft.) entered leaves a
remaining distance of  382.00 (Ft.)
```

```
Using Figure 3-4, the travel time for this distance is   4.47 minutes
for a distance of 382.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.82(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.475 Minutes
Tt=[(11.9*0.0723^3)/(  3.82)]^.385=  4.47
Total initial area Ti =   7.95 minutes from Figure 3-3 formula plus
  4.47 minutes from the Figure 3-4 formula =  12.42 minutes
Rainfall intensity (I) =      5.127(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.478
Subarea runoff =      1.912(CFS)
Total initial stream area =        0.780(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.200 to Point/Station       41.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   368.000(Ft.)
Downstream point/station elevation =   367.500(Ft.)
Pipe length =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     1.912(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     1.912(CFS)
Normal flow depth in pipe =    3.41(In.)
Flow top width inside pipe =   16.75(In.)
Critical Depth =    5.74(In.)
Pipe flow velocity =      7.01(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.45 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.200 to Point/Station       41.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      0.780(Ac.)
Runoff from this stream =      1.912(CFS)
Time of concentration =   12.45 min.
Rainfall intensity =     5.121(In/Hr)
Summary of stream data:

Stream    Flow rate       TC            Rainfall Intensity
 No.        (CFS)        (min)                 (In/Hr)


1        15.867       8.08           6.766
2         5.025      14.37           4.667
3         1.912      12.45           5.121
Qmax(1) =
            1.000 *    1.000 *    15.867) +
            1.000 *    0.562 *     5.025) +
            1.000 *    0.649 *     1.912) + =       19.933
Qmax(2) =
            0.690 *    1.000 *    15.867) +
            1.000 *    1.000 *     5.025) +
            0.911 *    1.000 *     1.912) + =       17.711
Qmax(3) =
            0.757 *    1.000 *    15.867) +
            1.000 *    0.866 *     5.025) +
            1.000 *    1.000 *     1.912) + =       18.271

Total of 3 main streams to confluence:
Flow rates before confluence point:
      15.867       5.025       1.912
Maximum flow rates at confluence using above data:
      19.933      17.711      18.271
Area of streams before confluence:
       9.290       2.150       0.780


Results of confluence:
Total flow rate =     19.933(CFS)
Time of concentration =     8.080 min.
Effective stream area after confluence  =     12.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   367.500(Ft.)
Downstream point/station elevation =   364.500(Ft.)
Pipe length =   362.82(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =    19.933(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow =    19.933(CFS)
Normal flow depth in pipe =   15.38(In.)
Flow top width inside pipe =   35.62(In.)
Critical Depth =   17.18(In.)
Pipe flow velocity =      6.93(Ft/s)
Travel time through pipe =    0.87 min.
Time of concentration (TC) =     8.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.220(Ac.)
Runoff from this stream =     19.933(CFS)
Time of concentration =    8.95 min.
Rainfall intensity =     6.333(In/Hr)
Program is now starting with Main Stream No. 2
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.100 to Point/Station       51.200
**** INITIAL AREA EVALUATION ****

----------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.700
[MEDIUM DENSITY RESIDENTIAL                 ]
(4.3 DU/A or Less          )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.499
Initial subarea total flow distance  =  431.000(Ft.)
Highest elevation =  378.000(Ft.)
Lowest elevation =  370.000(Ft.)
Elevation difference =    8.000(Ft.) Slope =  1.856 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.68 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4990)*(  80.000^.5)/(   2.000^(1/3)]=   7.68
The initial area total distance of  431.00 (Ft.) entered leaves a
remaining distance of  351.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.19 minutes
for a distance of 351.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.51(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.193 Minutes
Tt=[(11.9*0.0665^3)/(  3.51)]^.385=  4.19
Total initial area Ti =   7.68 minutes from Figure 3-3 formula plus
  4.19 minutes from the Figure 3-4 formula =  11.87 minutes
Rainfall intensity (I) =      5.279(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.499
Subarea runoff =      2.186(CFS)
Total initial stream area =        0.830(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.200 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

----------------------------------------------------------------------------
Upstream point/station elevation =   365.000(Ft.)
Downstream point/station elevation =   364.500(Ft.)
Pipe length =     9.90(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     2.186(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     2.186(CFS)
Normal flow depth in pipe =    3.64(In.)
Flow top width inside pipe =   17.21(In.)
Critical Depth =    6.15(In.)
Pipe flow velocity =      7.29(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    11.89 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.200 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****

----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.830(Ac.)
Runoff from this stream =      2.186(CFS)
Time of concentration =   11.89 min.
Rainfall intensity =     5.273(In/Hr)
Summary of stream data:

Stream    Flow rate       TC            Rainfall Intensity
 No.        (CFS)        (min)                 (In/Hr)


1       19.933       8.95            6.333
2        2.186      11.89            5.273
Qmax(1) =
            1.000 *    1.000 *    19.933) +
            1.000 *    0.753 *     2.186) + =       21.578
Qmax(2) =
            0.833 *    1.000 *    19.933) +
            1.000 *    1.000 *     2.186) + =       18.782

Total of 2 main streams to confluence:
Flow rates before confluence point:
      19.933       2.186
Maximum flow rates at confluence using above data:
       21.578       18.782
Area of streams before confluence:
       12.220        0.830


Results of confluence:
Total flow rate =      21.578(CFS)
Time of concentration =      8.953 min.
Effective stream area after confluence  =      13.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       49.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

----------------------------------------------------------------------------
Upstream point/station elevation =   364.500(Ft.)
Downstream point/station elevation =   362.500(Ft.)
Pipe length =   171.10(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     21.578(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow =     21.578(CFS)
Normal flow depth in pipe =    14.59(In.)
Flow top width inside pipe =   35.35(In.)
Critical Depth =   17.92(In.)
Pipe flow velocity =      8.03(Ft/s)
Travel time through pipe =    0.36 min.
Time of concentration (TC) =     9.31 min.
End of computations, total study area =          13.050 (Ac.)
```

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                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 7.3

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 11/12/12
--------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 5
--------------------------------------------------------------------------
Shapouri & Associates, Rancho Santa Fe, CA - S/N   968
--------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  3.500
24 hour precipitation(inches) =  6.000
P6/P24 =    58.3%
San Diego hydrology manual 'C' values used

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.100 to Point/Station       53.200
**** INITIAL AREA EVALUATION ****

------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                 ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  481.520(Ft.)
Highest elevation =  378.000(Ft.)
Lowest elevation =  371.000(Ft.)
Elevation difference =    7.000(Ft.) Slope =  1.454 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of  481.52 (Ft.) entered leaves a
remaining distance of  401.52 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.65 minutes
for a distance of 401.52 (Ft.) and a slope of  1.00 %
with an elevation difference of   4.02(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.650 Minutes
Tt=[(11.9*0.0760^3)/(  4.02)]^.385=  4.65
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  4.65 minutes from the Figure 3-4 formula =  12.96 minutes
Rainfall intensity (I) =      4.990(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.178(CFS)
Total initial stream area =        0.970(Ac.)


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Process from Point/Station       53.200 to Point/Station       43.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------
Upstream point/station elevation =   366.000(Ft.)
Downstream point/station elevation =   365.500(Ft.)
Pipe length =     9.22(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     2.178(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     2.178(CFS)
Normal flow depth in pipe =    3.57(In.)
Flow top width inside pipe =   17.08(In.)
Critical Depth =    6.15(In.)
Pipe flow velocity =      7.47(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.98 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.200 to Point/Station       43.000
**** CONFLUENCE OF MAIN STREAMS ****

------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.970(Ac.)
Runoff from this stream =      2.178(CFS)
Time of concentration =   12.98 min.
Rainfall intensity =     4.985(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.100 to Point/Station       54.200
**** INITIAL AREA EVALUATION ****

------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                 ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  465.520(Ft.)
Highest elevation =  378.000(Ft.)
Lowest elevation =  371.000(Ft.)
Elevation difference =    7.000(Ft.) Slope =  1.504 %
```

```
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of  465.52 (Ft.) entered leaves a
remaining distance of  385.52 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.51 minutes
for a distance of 385.52 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.86(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.507 Minutes
Tt=[(11.9*0.0730^3)/(  3.86)]^.385=  4.51
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  4.51 minutes from the Figure 3-4 formula =  12.81 minutes
Rainfall intensity (I) =      5.026(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.488(CFS)
Total initial stream area =        1.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.200 to Point/Station       43.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   366.000(Ft.)
Downstream point/station elevation =   365.500(Ft.)
Pipe length =    25.26(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     2.488(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     2.488(CFS)
Normal flow depth in pipe =    4.87(In.)
Flow top width inside pipe =   19.30(In.)
Critical Depth =    6.58(In.)
Pipe flow velocity =      5.45(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    12.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.200 to Point/Station       43.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.100(Ac.)
Runoff from this stream =      2.488(CFS)
Time of concentration =   12.89 min.
Rainfall intensity =     5.006(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

1        2.178     12.98           4.985
2        2.488     12.89           5.006
Qmax(1) =
           1.000 *    1.000 *     2.178) +
           0.996 *    1.000 *     2.488) + =       4.655
Qmax(2) =
           1.000 *    0.993 *     2.178) +
           1.000 *    1.000 *     2.488) + =       4.651

Total of 2 main streams to confluence:
Flow rates before confluence point:
      2.178       2.488
Maximum flow rates at confluence using above data:
      4.655       4.651
Area of streams before confluence:
      0.970       1.100


Results of confluence:
Total flow rate =      4.655(CFS)
Time of concentration =    12.976 min.
Effective stream area after confluence  =      2.070(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       45.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   365.500(Ft.)
Downstream point/station elevation =   365.000(Ft.)
Pipe length =   283.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow =     4.655(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     4.655(CFS)
Normal flow depth in pipe =   12.91(In.)
Flow top width inside pipe =   23.93(In.)
Critical Depth =    9.09(In.)
Pipe flow velocity =      2.70(Ft/s)
Travel time through pipe =    1.74 min.
Time of concentration (TC) =    14.72 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       45.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.070(Ac.)
Runoff from this stream =      4.655(CFS)
Time of concentration =   14.72 min.
Rainfall intensity =     4.595(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.100 to Point/Station       55.200
**** INITIAL AREA EVALUATION ****

------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  556.500(Ft.)
Highest elevation =  382.000(Ft.)
Lowest elevation =  374.000(Ft.)
Elevation difference =    8.000(Ft.) Slope =  1.438 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  2.110 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of  556.50 (Ft.) entered leaves a
remaining distance of  476.50 (Ft.)
Using Figure 3-4, the travel time for this distance is   3.98 minutes
for a distance of 476.50 (Ft.) and a slope of  2.11 %
with an elevation difference of  10.05(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    3.980 Minutes
Tt=[(11.9*0.0902^3)/( 10.05)]^.385=  3.98
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  3.98 minutes from the Figure 3-4 formula =  12.29 minutes
Rainfall intensity (I) =      5.164(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.579(CFS)
Total initial stream area =        1.110(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.200 to Point/Station       44.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

------------------------------------------------------------------------------
Upstream point/station elevation =   369.000(Ft.)
Downstream point/station elevation =   365.500(Ft.)
Pipe length =   307.24(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.579(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.579(CFS)
Normal flow depth in pipe =    5.69(In.)
Flow top width inside pipe =   20.41(In.)
Critical Depth =    6.69(In.)
Pipe flow velocity =      4.53(Ft/s)
Travel time through pipe =    1.13 min.
Time of concentration (TC) =    13.42 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.200 to Point/Station       44.000
**** CONFLUENCE OF MINOR STREAMS ****

------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.110(Ac.)
Runoff from this stream =      2.579(CFS)
Time of concentration =   13.42 min.
Rainfall intensity =     4.879(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       56.100 to Point/Station       56.200
**** INITIAL AREA EVALUATION ****

------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  467.800(Ft.)
Highest elevation =  378.000(Ft.)
Lowest elevation =  371.000(Ft.)
Elevation difference =    7.000(Ft.) Slope =  1.496 %
Top of Initial Area Slope adjusted by User to  2.950 %
Bottom of Initial Area Slope adjusted by User to  1.050 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 95.00 (Ft)
for the top area slope value of   2.95 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   7.95 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  95.000^.5)/(   2.950^(1/3)]=   7.95
The initial area total distance of  467.80 (Ft.) entered leaves a
remaining distance of  372.80 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.31 minutes
for a distance of 372.80 (Ft.) and a slope of  1.05 %
with an elevation difference of   3.91(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.310 Minutes
Tt=[(11.9*0.0706^3)/(  3.91)]^.385=  4.31
Total initial area Ti =   7.95 minutes from Figure 3-3 formula plus
  4.31 minutes from the Figure 3-4 formula =  12.26 minutes
Rainfall intensity (I) =      5.171(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.164(CFS)
Total initial stream area =        0.930(Ac.)
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Process from Point/Station       56.200 to Point/Station       44.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    366.000(Ft.)
Downstream point/station elevation =   365.500(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.164(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.164(CFS)
Normal flow depth in pipe =    3.54(In.)
Flow top width inside pipe =   17.01(In.)
Critical Depth =    6.13(In.)
Pipe flow velocity =      7.52(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       56.200 to Point/Station       44.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      2.164(CFS)
Time of concentration =   12.28 min.
Rainfall intensity =     5.165(In/Hr)
Summary of stream data:

Stream    Flow rate       TC            Rainfall Intensity
 No.        (CFS)        (min)                 (In/Hr)


1         2.579      13.42           4.879
2         2.164      12.28           5.165
Qmax(1) =
             1.000 *     1.000 *      2.579) +
             0.945 *     1.000 *      2.164) + =        4.623
Qmax(2) =
             1.000 *     0.915 *      2.579) +
             1.000 *     1.000 *      2.164) + =        4.525

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.579        2.164
Maximum flow rates at confluence using above data:
       4.623        4.525
Area of streams before confluence:
       1.110        0.930
Results of confluence:
Total flow rate =      4.623(CFS)
Time of concentration =    13.417 min.
Effective stream area after confluence =      2.040(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       44.000 to Point/Station       45.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    365.500(Ft.)
Downstream point/station elevation =   365.000(Ft.)
Pipe length  =   106.76(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.623(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.623(CFS)
Normal flow depth in pipe =    9.71(In.)
Flow top width inside pipe =   23.56(In.)
Critical Depth =    9.08(In.)
Pipe flow velocity =      3.88(Ft/s)
Travel time through pipe =    0.46 min.
Time of concentration (TC) =    13.88 min.


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Process from Point/Station       44.000 to Point/Station       45.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.040(Ac.)
Runoff from this stream =      4.623(CFS)
Time of concentration =   13.88 min.
Rainfall intensity =     4.774(In/Hr)
Summary of stream data:

Stream    Flow rate       TC            Rainfall Intensity
 No.        (CFS)        (min)                 (In/Hr)


1         4.655      14.72           4.595
2         4.623      13.88           4.774
Qmax(1) =
             1.000 *     1.000 *      4.655) +
             0.963 *     1.000 *      4.623) + =        9.105
Qmax(2) =
             1.000 *     0.943 *      4.655) +
             1.000 *     1.000 *      4.623) + =        9.011

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.655        4.623
Maximum flow rates at confluence using above data:
       9.105        9.011
Area of streams before confluence:
       2.070        2.040


Results of confluence:
Total flow rate =      9.105(CFS)
Time of concentration =    14.721 min.
Effective stream area after confluence  =      4.110(Ac.)
```

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Process from Point/Station       45.000 to Point/Station       46.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    365.000(Ft.)
Downstream point/station elevation =    364.500(Ft.)
Pipe length =     83.23(Ft.)    Manning's N = 0.015
No. of pipes = 1  Required pipe flow =      9.105(CFS)
Given pipe size =      24.00(In.)
Calculated individual pipe flow =      9.105(CFS)
Normal flow depth in pipe =    13.38(In.)
Flow top width inside pipe =    23.84(In.)
Critical Depth =    12.92(In.)
Pipe flow velocity =       5.05(Ft/s)
Travel time through pipe =     0.27 min.
Time of concentration (TC) =     15.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.000 to Point/Station       46.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =       4.110(Ac.)
Runoff from this stream =       9.105(CFS)
Time of concentration =    15.00 min.
Rainfall intensity =     4.541(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.100 to Point/Station       57.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                 ]
(4.3 DU/A or Less        )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  502.750(Ft.)
Highest elevation =  374.000(Ft.)
Lowest elevation =  370.000(Ft.)
Elevation difference =     4.000(Ft.) Slope =  0.796 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of    2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =    8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=    8.31
The initial area total distance of  502.75 (Ft.) entered leaves a
remaining distance of  422.75 (Ft.)
Using Figure 3-4, the travel time for this distance is    4.84 minutes
for a distance of 422.75 (Ft.) and a slope of  1.00 %
with an elevation difference of    4.23(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.838 Minutes
Tt=[(11.9*0.0801^3)/(  4.23)]^.385=  4.84
Total initial area Ti =    8.31 minutes from Figure 3-3 formula plus
  4.84 minutes from the Figure 3-4 formula =  13.14 minutes
Rainfall intensity (I) =      4.944(In/Hr) for a    100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =       2.736(CFS)
Total initial stream area =        1.230(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.200 to Point/Station       46.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    365.000(Ft.)
Downstream point/station elevation =    364.500(Ft.)
Pipe length =     9.00(Ft.)    Manning's N = 0.015
No. of pipes = 1  Required pipe flow =      2.736(CFS)
Given pipe size =      24.00(In.)
Calculated individual pipe flow =      2.736(CFS)
Normal flow depth in pipe =     3.96(In.)
Flow top width inside pipe =    17.82(In.)
Critical Depth =     6.90(In.)
Pipe flow velocity =       8.06(Ft/s)
Travel time through pipe =     0.02 min.
Time of concentration (TC) =     13.16 min.


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Process from Point/Station       57.200 to Point/Station       46.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       1.230(Ac.)
Runoff from this stream =       2.736(CFS)
Time of concentration =    13.16 min.
Rainfall intensity =     4.939(In/Hr)
Summary of stream data:

Stream    Flow rate       TC            Rainfall Intensity
 No.        (CFS)        (min)                  (In/Hr)



1         9.105      15.00            4.541
2         2.736      13.16            4.939
Qmax(1) =
          1.000 *     1.000 *      9.105) +
          0.919 *     1.000 *      2.736) + =       11.621
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```
Qmax(2) =
          1.000 *    0.878 *     9.105) +
          1.000 *    1.000 *     2.736) + =      10.729

Total of 2 main streams to confluence:
Flow rates before confluence point:
      9.105       2.736
Maximum flow rates at confluence using above data:
     11.621      10.729
Area of streams before confluence:
      4.110       1.230


Results of confluence:
Total flow rate =     11.621(CFS)
Time of concentration =    14.996 min.
Effective stream area after confluence  =      5.340(Ac.)


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Process from Point/Station       46.000 to Point/Station       47.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   364.500(Ft.)
Downstream point/station elevation =   363.500(Ft.)
Pipe length  =   116.88(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    11.621(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    11.621(CFS)
Normal flow depth in pipe =   13.97(In.)
Flow top width inside pipe =   23.67(In.)
Critical Depth =   14.68(In.)
Pipe flow velocity =      6.13(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =    15.31 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       46.000 to Point/Station       47.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.340(Ac.)
Runoff from this stream =     11.621(CFS)
Time of concentration =   15.31 min.
Rainfall intensity =     4.480(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       58.100 to Point/Station       58.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[MEDIUM DENSITY RESIDENTIAL                    ]
(4.3 DU/A or Less       )
Impervious value, Ai = 0.300
Sub-Area C Value = 0.450
Initial subarea total flow distance  =  464.240(Ft.)
Highest elevation =  382.000(Ft.)
Lowest elevation =  370.000(Ft.)
Elevation difference =   12.000(Ft.) Slope =  2.585 %
Top of Initial Area Slope adjusted by User to  2.000 %
Bottom of Initial Area Slope adjusted by User to  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.00 %, in a development type of
 4.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   8.31 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  80.000^.5)/(   2.000^(1/3)]=   8.31
The initial area total distance of  464.24 (Ft.) entered leaves a
remaining distance of  384.24 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.50 minutes
for a distance of 384.24 (Ft.) and a slope of  1.00 %
with an elevation difference of   3.84(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.495 Minutes
Tt=[(11.9*0.0728^3)/(  3.84)]^.385=  4.50
Total initial area Ti =   8.31 minutes from Figure 3-3 formula plus
  4.50 minutes from the Figure 3-4 formula =  12.80 minutes
Rainfall intensity (I) =      5.029(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      2.512(CFS)
Total initial stream area =       1.110(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       58.200 to Point/Station       47.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   365.000(Ft.)
Downstream point/station elevation =   363.500(Ft.)
Pipe length  =    76.70(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.512(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     2.512(CFS)
Normal flow depth in pipe =    4.91(In.)
Flow top width inside pipe =   19.36(In.)
Critical Depth =    6.62(In.)
Pipe flow velocity =      5.44(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    13.04 min.
```