A CEQA LEVEL OF PRELIMINARY DRAINAGE REPORT FOR:

LILAC HILLS RANCH IMPLEMENTING TM TM 5572 RPL-3

San Diego County, California

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Rev. date: 5-3-13

David Yeh, RCE 62717, EXP 6-30-14
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DISCUSSION

PURPOSE FOR PROJECT

The purpose of this project is to subdivide 115 acres of rural land into a master-planned community with residential, parks and extensive open spaces. The project site situated on the northeasterly upstream of a much larger watershed that drains southwesterly into San Luis Rey River.
DESCRIPTION OF WATERSHED

The project is located on the east side of Interstate 15, southerly of W. Lilac Road in the County of San Diego, State of California.

This project is the first implementing portion of a 1746 lot master-planned community – Lilac Hills Ranch. The project proposes the construction of 350 dwelling units with paved roadways and parks and a sewer treatment plant on the northerly tip of the future master-planned community. The implementing TM consists of 114.9 Acres within the project boundary and approximately 11.0 acres outside of the project boundary that includes approximately the additional grading for the construction of the access road, sewer treatment plant and a detention basin. The total project disturbance footprint is approximately 125.9 acres. For purposes of comparison, only the areas with the disturbance footprint is modeled and analyzed.

The project site is situated within the northerly sub drainage basin – one of three sub basins that flows through the overall master-planned project boundary. The northerly sub drainage basin is approximately 395 acres. Under the pre-development conditions, the runoff from this sub-basin flows into a series of natural channels in a general northeasterly to southwesterly direction. These natural channels confluence into a major natural channel approximately 1300’ southerly of the southerly project tip. This confluence point is designated as the project final discharge point.

The overall grading design of the project will follow the existing landform to minimize both on-site and off-site runoff diversion. Under the proposed conditions, the northerly portion of the site, adjacent to the existing W. Lilac Road, drains into a proposed underground storm drainage system that conveys the runoff westerly along the proposed Street Z then southerly along the proposed extension of W. Lilac Road to a proposed detention basin located just southerly of the project boundary. The southerly tip of the westerly half of the project drains to a low point located in the proposed street, then the runoff is conveyed onto the easterly natural terrain via a proposed storm drain, the runoff then flows southerly in the natural channel then confluences with the mitigated runoff from the detention basin before leaving the project southerly boundary at the final discharge point.

The purpose of this report is to determine the peak runoff rates under the post-development conditions and to size the preliminary stormdrain pipes. The runoff volume will also be analyzed to size the detention basin to mitigate the anticipated increase in discharge volume.
METHODOLOGY

3.1 THE RATIONAL METHOD

The Rational Method (RM) is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. The RM is recommended for analyzing the runoff response from drainage areas up to approximately 1 square mile in size. It should not be used in instances where there is a junction of independent drainage systems or for drainage areas greater than approximately 1 square mile in size. In these instances, the Modified Rational Method (MRM) should be used for junctions of independent drainage systems in watersheds up to approximately 1 square mile in size (see Section 3.4); or the NRCS Hydrologic Method should be used for watersheds greater than approximately 1 square mile in size (see Section 4).

The RM can be applied using any design storm frequency (e.g., 100-year, 50-year, 10-year, etc.). The local agency determines the design storm frequency that must be used based on the type of project and specific local requirements. A discussion of design storm frequency is provided in Section 2.3 of this manual. A procedure has been developed that converts the 6-hour and 24-hour precipitation isopluvial map data to an Intensity-Duration curve that can be used for the rainfall intensity in the RM formula as shown in Figure 3-1. The RM is applicable to a 6-hour storm duration because the procedure uses Intensity-Duration Design Charts that are based on a 6-hour storm duration.

3.1.1 Rational Method Formula

The RM formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (T_C), which is the time required for water to
flow from the most remote point of the basin to the location being analyzed. The RM formula is expressed as follows:

\[ Q = CIA \]

Where:
- \( Q \) = peak discharge, in cubic feet per second (cfs)
- \( C \) = runoff coefficient, proportion of the rainfall that runs off the surface (no units)
- \( I \) = average rainfall intensity for a duration equal to the \( T_e \) for the area, in inches per hour (Note: If the computed \( T_e \) is less than 5 minutes, use 5 minutes for computing the peak discharge, \( Q \))
- \( A \) = drainage area contributing to the design location, in acres

Combining the units for the expression CIA yields:

\[
\left( \frac{1 \text{ acre} \times \text{inch}}{\text{hour}} \right) \left( \frac{43,560 \text{ ft}^2}{\text{acre}} \right) \left( \frac{1 \text{ foot}}{12 \text{ inches}} \right) \left( \frac{1 \text{ hour}}{3,600 \text{ seconds}} \right) = 1.008 \text{ cfs}
\]

For practical purposes the unit conversion coefficient difference of 0.8% can be ignored.

The RM formula is based on the assumption that for constant rainfall intensity, the peak discharge rate at a point will occur when the raindrop that falls at the most upstream point in the tributary drainage basin arrives at the point of interest.

Unlike the MRM (discussed in Section 3.4) or the NRCS hydrologic method (discussed in Section 4), the RM does not create hydrographs and therefore does not add separate subarea hydrographs at collection points. Instead, the RM develops peak discharges in the main line by increasing the \( T_e \) as flow travels downstream.

Characteristics of, or assumptions inherent to, the RM are listed below:

- The discharge flow rate resulting from any \( I \) is maximum when the \( I \) lasts as long as or longer than the \( T_e \).
• The storm frequency of peak discharges is the same as that of I for the given $T_c$.

• The fraction of rainfall that becomes runoff (or the runoff coefficient, $C$) is independent of I or precipitation zone number (PZN) condition (PZN Condition is discussed in Section 4.1.2.4).

• The peak rate of runoff is the only information produced by using the RM.

3.1.2 Runoff Coefficient

Table 3-1 lists the estimated runoff coefficients for urban areas. The concepts related to the runoff coefficient were evaluated in a report entitled *Evaluation, Rational Method “C” Values* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

The runoff coefficients are based on land use and soil type. Soil type can be determined from the soil type map provided in Appendix A. An appropriate runoff coefficient ($C$) for each type of land use in the subarea should be selected from this table and multiplied by the percentage of the total area ($A$) included in that class. The sum of the products for all land uses is the weighted runoff coefficient ($\Sigma[CA]$). Good engineering judgment should be used when applying the values presented in Table 3-1, as adjustments to these values may be appropriate based on site-specific characteristics. In any event, the impervious percentage (% Impervious) as given in the table, for any area, shall govern the selected value for $C$. The runoff coefficient can also be calculated for an area based on soil type and impervious percentage using the following formula:
C = 0.90 \times (\% \text{ Impervious}) + C_p \times (1 - \% \text{ Impervious})

Where: \( C_p \) = Pervious Coefficient Runoff Value for the soil type (shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0\% Impervious). Soil type can be determined from the soil type map provided in Appendix A.

The values in Table 3-1 are typical for most urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the local agency.
3.1.4 Time of Concentration

The Time of Concentration (T_c) is the time required for runoff to flow from the most remote part of the drainage area to the point of interest. The T_c is composed of two components: initial time of concentration (T_i) and travel time (T_t). Methods of computation for T_i and T_t are discussed below. The T_i is the time required for runoff to travel across the surface of the most remote subarea in the study, or “initial subarea.” Guidelines for designating the initial subarea are provided within the discussion of computation of T_i. The T_t is the time required for the runoff to flow in a watercourse (e.g., swale, channel, gutter, pipe) or series of watercourses from the initial subarea to the point of interest. For the RM, the T_c at any point within the drainage area is given by:

\[ T_c = T_i + T_t \]

Methods of calculation differ for natural watersheds (nonurbanized) and for urban drainage systems. When analyzing storm drain systems, the designer must consider the possibility that an existing natural watershed may become urbanized during the useful life of the storm drain system. Future land uses must be used for T_c and runoff calculations, and can be determined from the local Community General Plan.

3.1.4.1 Initial Time of Concentration

The initial time of concentration is typically based on sheet flow at the upstream end of a drainage basin. The Overland Time of Flow (Figure 3-3) is approximated by an equation developed by the Federal Aviation Agency (FAA) for analyzing flow on runways (FAA, 1970). The usual runway configuration consists of a crown, like most freeways, with sloping pavement that directs flow to either side of the runway. This type of flow is uniform in the direction perpendicular to the velocity and is very shallow. Since these depths are 1/4 of an inch (more or less) in magnitude, the relative roughness is high. Some higher relative roughness values for overland flow are presented in Table 3.5 of the HEC-1 Flood Hydrograph Package User's Manual (USACE, 1990).
SUMMARY

PEAK DISCHARGE RATE

The proposed detention pond for each sub-basin is adequately size to store all the excessive runoff volume. Their outlet structures will restrict the peak runoff rate exiting these ponds at or below that of under the pre-development conditions. Based on the minimum volume requirement –a detention pond in the volume of 12.5 Ac-Ft is proposed for the development. The proposed detention basin has adequate storage volume to hold the entire excess runoff from the proposed development, the outlet structure will be designed to release no more than 78 cfs to from the detention basin such that the total peak discharge from the entire project site at the final discharge point is less than that of the pre-development conditions. The proposed development will not adversely affect the downstream drainage facilities.

RUNOFF VOLUME

<table>
<thead>
<tr>
<th>BASIN 100</th>
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<tbody>
<tr>
<td>PRE-DEV (Ac-Ft)</td>
</tr>
<tr>
<td>POST-DEV (Ac-Ft)</td>
</tr>
<tr>
<td>DETENTION VOL (Ac-Ft)</td>
</tr>
<tr>
<td>DESIGN VOL (Ac-Ft)</td>
</tr>
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</table>
DECLARATION OF RESPONSIBLE CHARGE

I hereby declare that I am the civil Engineer of Work for this project, that I have exercised responsible charge over the design of this project as defined in Section 6703 of the Business and Professions code, and that the design is consistent with current design.

I understand that the check of project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as Engineer of Work, of my responsibilities for project design.

________________________________________
David Yeh, RCE 62717, EXP 6-30-14
100-YEAR HYDROLOGY CALCULATIONS
PRE-DEVELOPMENT CONDITIONS

******************************************************************************
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2004 Advanced Engineering Software (aes)
Ver. 2.0 Release Date: 01/01/2004 License ID 1503

Analysis prepared by:
LANDMARK CONSULTING
9555 GENESEE AVE. SUITE 200
SAN DIEGO, CA 92121
TEL: 858-587-8070, FAX: 858-587-8750

FILE NAME: 1037EX.DAT
TIME/DATE OF STUDY: 09:50 02/17/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>HALF-CROWN TO STREET-CROSSFALL</th>
<th>CURB GUTTER-GEOMETRIES</th>
<th>MANNING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WIDTH</td>
<td>CROSSFALL</td>
<td>IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR</td>
</tr>
<tr>
<td></td>
<td>(FT)</td>
<td>(FT)</td>
<td>(FT) (FT) (FT) (FT) (n)</td>
</tr>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020 0.67</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 21

RATIONAL METHOD INITIAL SUBAREA ANALYSIS

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
INITIAL SUBAREA FLOW-LENGTH (FEET) = 60.00
UPSTREAM ELEVATION (FEET) = 1042.00
DOWNSTREAM ELEVATION (FEET) = 1038.00
ELEVATION DIFFERENCE (FEET) = 4.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 5.482
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 8.690
SUBAREA RUNOFF (CFS) = 0.31
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.31

FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 51

COMPUTE TRAPEZOIDAL CHANNEL FLOW

ELEVATION DATA: UPSTREAM (FEET) = 1038.00 DOWNSTREAM (FEET) = 826.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 2700.00 CHANNEL SLOPE = 0.0785
CHANNEL BASE (FEET) = 15.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH (FEET) = 2.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.488
LEGUMES (STRAIGHT ROW) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 81
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 43.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.60
AVERAGE FLOW DEPTH (FEET) = 0.58 TRAVEL TIME (MIN.) = 9.79
Tc (MIN.) = 15.27
SUBAREA AREA (ACRES) = 57.80 SUBAREA RUNOFF (CFS) = 77.82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA (ACRES) = 57.90 PEAK FLOW RATE (CFS) = 77.98

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.83 FLOW VELOCITY (FEET/SEC.) = 5.66
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 103.00 = 2760.00 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 1

DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 15.27
RAINFALL INTENSITY (INCH/HR) = 4.49
TOTAL STREAM AREA (ACRES) = 57.90
PEAK FLOW RATE (CFS) AT CONFLUENCE = 77.98

FLOW PROCESS FROM NODE 104.00 TO NODE 105.00 IS CODE = 21

RATIONAL METHOD INITIAL SUBAREA ANALYSIS
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
INITIAL SUBAREA FLOW-LENGTH( FEET) = 60.00
UPSTREAM ELEVATION( FEET) = 928.00
DOWNSTREAM ELEVATION( FEET) = 927.00
ELEVATION DIFFERENCE( FEET) = 1.00
SUBAREA OVERLAND TIME OF FLOW( MIN.) = 8.702
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.450
SUBAREA RUNOFF( CFS) = 0.23
TOTAL AREA( ACRES) = 0.10 TOTAL RUNOFF( CFS) = 0.23

FLOW PROCESS FROM NODE  105.00 TO NODE 103.00 IS CODE = 51

FLOW PROCESS FROM NODE  103.00 TO NODE 103.00 IS CODE = 1

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 77.98 15.27 4.488 57.90
2 28.12 15.20 4.502 20.80

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.
** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>105.74</td>
<td>15.20</td>
<td>4.502</td>
</tr>
<tr>
<td>2</td>
<td>106.02</td>
<td>15.27</td>
<td>4.488</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 106.02    Tc (MIN.) = 15.27
TOTAL AREA (ACRES) = 78.70
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 103.00 = 2760.00 FEET.

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

FLOW PROCESS FROM NODE 103.00 TO NODE 106.00 IS CODE = 51

>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW

>>> TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)

ELEVATION DATA: UPSTREAM (FEET) = 826.00  DOWNSTREAM (FEET) = 794.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 780.00  CHANNEL SLOPE = 0.0410
CHANNEL BASE (FEET) = 24.00  "Z" FACTOR = 2.500
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH (FEET) = 2.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.017
LEGUMES (STRAIGHT ROW) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 81
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 113.67
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.54
AVERAGE FLOW DEPTH (FEET) = 0.95  TRAVEL TIME (MIN.) = 2.86
Tc (MIN.) = 18.13
SUBAREA AREA (ACRES) = 12.70  SUBAREA RUNOFF (CFS) = 15.31
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA (ACRES) = 91.40  PEAK FLOW RATE (CFS) = 110.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.93  FLOW VELOCITY (FEET/SEC.) = 4.48
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 106.00 = 3540.00 FEET.

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

FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 18.13
RAINFALL INTENSITY (INCH/HR) = 4.02
TOTAL STREAM AREA (ACRES) = 91.40
PEAK FLOW RATE (CFS) AT CONFLUENCE = 110.20

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

FLOW PROCESS FROM NODE 107.00 TO NODE 108.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS

LEGUMES (STRAIGHT ROW) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 81
INITIAL SUBAREA FLOW-LENGTH (FEET) = 60.00
UPSTREAM ELEVATION (FEET) = 958.00
DOWNSTREAM ELEVATION (FEET) = 956.00

22
ELEVATION DIFFERENCE (FEET) = 2.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 7.467
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.120
SUBAREA RUNOFF (CFS) = 0.21
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.21

FLOW PROCESS FROM NODE 108.00 TO NODE 106.00 IS CODE = 51

FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 11.56
RAINFALL INTENSITY (INCH/HR) = 5.37
TOTAL STREAM AREA (ACRES) = 9.80
PEAK FLOW RATE (CFS) AT CONFLUENCE = 15.79

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 110.20 18.13 4.017 91.40
2 15.79 11.56 5.370 9.80

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 98.23 11.56 5.370
2 122.01 18.13 4.017
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 122.01  Tc (MIN.) = 18.13
TOTAL AREA (ACRES) = 101.20
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 106.00 = 3540.00 FEET.

FLOW PROCESS FROM NODE 106.00 TO NODE 109.00 IS CODE = 51

FLOW PROCESS FROM NODE 109.00 TO NODE 110.00 IS CODE = 10

FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21

FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 51
ELEVATION DATA: UPSTREAM (FEET) = 988.00 DOWNSTREAM (FEET) = 842.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 1340.00 CHANNEL SLOPE = 0.1090
CHANNEL BASE (FEET) = 16.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH (FEET) = 5.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.183
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 17.32
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.40
AVERAGE FLOW DEPTH (FEET) = 0.20 TRAVEL TIME (MIN.) = 4.13
Tc (MIN.) = 12.21
SUBAREA AREA (ACRES) = 18.20 SUBAREA RUNOFF (CFS) = 33.96
AREA-AVERAGE RUNOFF COEFFICIENT = 0.360
TOTAL AREA (ACRES) = 18.30 PEAK FLOW RATE (CFS) = 34.12
END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.29 FLOW VELOCITY (FEET/SEC.) = 7.03
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 112.00 = 1390.00 FEET.

FLOW PROCESS FROM NODE 112.00 TO NODE 112.00 IS CODE = 1
-----------------------------------------------
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 12.21
RAINFALL INTENSITY (INCH/HR) = 5.18
TOTAL STREAM AREA (ACRES) = 18.30
PEAK FLOW RATE (CFS) AT CONFLUENCE = 34.12

FLOW PROCESS FROM NODE 113.00 TO NODE 114.00 IS CODE = 21
-----------------------------------------------
>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS <<<
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
INITIAL SUBAREA FLOW LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 978.00
DOWNSTREAM ELEVATION (FEET) = 977.00
ELEVATION DIFFERENCE (FEET) = 1.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 7.476
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.114
SUBAREA RUNOFF (CFS) = 0.26
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.26

FLOW PROCESS FROM NODE 114.00 TO NODE 112.00 IS CODE = 51
-----------------------------------------------
>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW <<<
>>> TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT) <<<
ELEVATION DATA: UPSTREAM (FEET) = 977.00 DOWNSTREAM (FEET) = 842.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 1870.00 CHANNEL SLOPE = 0.0722
CHANNEL BASE (FEET) = 24.00 "Z" FACTOR = 10.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH (FEET) = 5.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.441
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.00
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.87
AVERAGE FLOW DEPTH(FEET) = 0.17 TRAVEL TIME(MIN.) = 8.04
Tc(MIN.) = 15.52
SUBAREA AREA(ACRES) = 19.90 SUBAREA RUNOFF(CFS) = 31.82
AREA-AVERAGE RUNOFF COEFFICIENT = 0.360
TOTAL AREA(ACRES) = 20.00 PEAK FLOW RATE(CFS) = 31.98
END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.25 FLOW VELOCITY(FEET/SEC.) = 4.89
LONGEST FLOWPATH FROM NODE 113.00 TO NODE 112.00 = 1920.00 FEET.

FLOW PROCESS FROM NODE 112.00 TO NODE 112.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.52
RAINFALL INTENSITY(INCH/HR) = 4.44
TOTAL STREAM AREA(ACRES) = 20.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 31.98

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 34.12 12.21 5.183 18.30
2 31.98 15.52 4.441 20.00

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 59.28 12.21 5.183
2 61.21 15.52 4.441

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 61.21 Tc(MIN.) = 15.52
TOTAL AREA(ACRES) = 38.30
LONGEST FLOWPATH FROM NODE 113.00 TO NODE 112.00 = 1920.00 FEET.

FLOW PROCESS FROM NODE 112.00 TO NODE 109.00 IS CODE = 51

ELEVATION DATA: UPSTREAM(FEET) = 842.00 DOWNSTREAM(FEET) = 786.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 875.00 CHANNEL SLOPE = 0.0640
CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 5.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.200
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 68.85
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/SEC.) = 10.37
AVERAGE FLOW DEPTH(Feet) = 1.08  TRAVEL TIME(MIN.) = 1.41
Tc(MIN.) = 16.93
SUBAREA AREA(ACRES) = 10.10  SUBAREA RUNOFF(CFS) = 15.27
AREA-AVERAGE RUNOFF COEFFICIENT = 0.36
TOTAL AREA(ACRES) = 48.40  PEAK FLOW RATE(CFS) = 73.15

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.11  FLOW VELOCITY(Feet/SEC.) = 10.58
LONGEST FLOWPATH FROM NODE 113.00 TO NODE 109.00 = 2795.00 FEET.

FLOW PROCESS FROM NODE 109.00 TO NODE 109.00 IS CODE = 11

** MAIN STREAM CONFLUENCE DATA **
STREAM     RUNOFF     Tc      INTENSITY     AREA
NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
1       73.15    16.93       4.200       48.40
LONGEST FLOWPATH FROM NODE 113.00 TO NODE 109.00 = 2795.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM     RUNOFF     Tc      INTENSITY     AREA
NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
1      122.01    18.48       3.968      101.90
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 109.00 = 3684.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc      INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
1     184.91      16.93        4.200
2     191.13      18.48        3.968

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 191.13  Tc(MIN.) = 18.48
TOTAL AREA(ACRES) = 150.30

FLOW PROCESS FROM NODE 109.00 TO NODE 109.00 IS CODE = 12

** CLEAR MEMORY BANK # 1 **

FLOW PROCESS FROM NODE 109.00 TO NODE 115.00 IS CODE = 51

** COMPUTE TRAPEZOIDAL CHANNEL FLOW **

ELEVATION DATA: UPSTREAM(Feet) = 786.00  DOWNSTREAM(Feet) = 772.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 526.00  CHANNEL SLOPE = 0.0266
CHANNEL BASE(Feet) = 6.00  "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH(Feet) = 5.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.762
LEGUMES(STRAIGHT ROW) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 81
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 194.92
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.49
AVERAGE FLOW DEPTH(FEET) = 2.58 TRAVEL TIME(MIN.) = 1.60
Tc(MIN.) = 20.08
SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 7.56
AREA-AVERAGE RUNOFF COEFFICIENT = 0.319
TOTAL AREA(ACRES) = 157.00 PEAK FLOW RATE(CFS) = 191.13

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.55 FLOW VELOCITY(FEET/SEC.) = 5.48
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 115.00 = 4210.00 FEET.

*****************************************************************************
FLOW PROCESS FROM NODE 115.00 TO NODE 115.00 IS CODE = 1

-----------------------------------------------------------------------------
>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
-----------------------------------------------------------------------------
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 20.08
RAINFALL INTENSITY(INCH/HR) = 3.76
TOTAL STREAM AREA(ACRES) = 157.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 191.13

*****************************************************************************
FLOW PROCESS FROM NODE 116.00 TO NODE 117.00 IS CODE = 21

-----------------------------------------------------------------------------
>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
-----------------------------------------------------------------------------
LEGUMES(STRAIGHT ROW) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 81
INITIAL SUBAREA FLOW-LENGTH(FEET) = 50.00
UPSTREAM ELEVATION(FEET) = 895.50
DOWNSTREAM ELEVATION(FEET) = 894.00
ELEVATION DIFFERENCE(FEET) = 1.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.060
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.382
SUBAREA RUNOFF(CFS) = 0.22
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.22

*****************************************************************************
FLOW PROCESS FROM NODE 117.00 TO NODE 115.00 IS CODE = 51

-----------------------------------------------------------------------------
>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>> TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
-----------------------------------------------------------------------------
ELEVATION DATA: UPSTREAM(FEET) = 894.00 DOWNSTREAM(FEET) = 772.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1120.00 CHANNEL SLOPE = 0.1089
CHANNEL BASE(FEET) = 6.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH(FEET) = 5.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.152
LEGUMES(STRAIGHT ROW) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 81
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.47
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 3.54
AVERAGE FLOW DEPTH(FEET) = 0.32 TRAVEL TIME(MIN.) = 5.27
Tc(MIN.) = 12.33
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 14.07
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 9.20 PEAK FLOW RATE(CFS) = 14.22

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.46 FLOW VELOCITY(Feet/Sec.) = 4.44
LONGEST FLOWPATH FROM NODE 116.00 TO NODE 115.00 = 1170.00 FEET.

***********************************************************************
FLOW PROCESS FROM NODE 115.00 TO NODE 115.00 IS CODE = 1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
============================================================================
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 12.33
RAINFALL INTENSITY(INCH/HR) = 5.15
TOTAL STREAM AREA(ACRES) = 9.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.22

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 191.13 20.08 3.762 157.00
2 14.22 12.33 5.152 9.20

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 131.60 12.33 5.152
2 201.52 20.08 3.762

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 201.52 Tc(MIN.) = 20.08
TOTAL AREA(ACRES) = 166.20
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 115.00 = 4210.00 FEET.

***********************************************************************
FLOW PROCESS FROM NODE 115.00 TO NODE 118.00 IS CODE = 51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(Feet) = 772.00 DOWNSTREAM(Feet) = 636.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 1966.00 CHANNEL SLOPE = 0.0692
CHANNEL BASE(Feet) = 24.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH(Feet) = 5.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.269
LEGUMES(STRAIGHT ROW) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 81
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 221.20
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 6.71
AVERAGE FLOW DEPTH(Feet) = 1.19 TRAVEL TIME(MIN.) = 4.88
Tc(MIN.) = 24.96
SUBAREA AREA (ACRES) = 40.10       SUBAREA RUNOFF (CFS) = 39.33
AREA-AVERAGE RUNOFF COEFFICIENT = 0.314
TOTAL AREA (ACRES) = 206.30       PEAK FLOW RATE (CFS) = 211.84

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.16       FLOW VELOCITY (FEET/SEC.) = 6.62
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 118.00 = 6176.00 FEET.

FLOW PROCESS FROM NODE 118.00 TO NODE 118.00 IS CODE = 10

FLOW PROCESS FROM NODE 119.00 TO NODE 120.00 IS CODE = 21

FLOW PROCESS FROM NODE 120.00 TO NODE 118.00 IS CODE = 51

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.46       FLOW VELOCITY (FEET/SEC.) = 5.24
LONGEST FLOWPATH FROM NODE 119.00 TO NODE 118.00 = 2155.00 FEET.

FLOW PROCESS FROM NODE 118.00 TO NODE 118.00 IS CODE = 10
FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 21

FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 51

FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 1

FLOW PROCESS FROM NODE 124.00 TO NODE 125.00 IS CODE = 21
RATIONAL METHOD INITIAL SUBAREA ANALYSIS

- Chaparral (Broadleaf) good cover runoff coefficient = 0.300
- Soil classification is "C"
- S.C.S. Curve number (AMC II) = 71
- Initial subarea flow-length (feet) = 50.00
- Upstream elevation (feet) = 1015.00
- Downstream elevation (feet) = 1014.00
- Elevation difference (feet) = 1.00
- Subarea overland time of flow (min.) = 8.082
- 100 year rainfall intensity (inch/hour) = 6.765
- Subarea runoff (cfs) = 0.20
- Total area (acres) = 0.10
- Total runoff (cfs) = 0.20

Flow process from node 125.00 to node 123.00 is code = 51

COMPUTE TRAPEZOIDAL CHANNEL FLOW

- Elevation data: upstream (feet) = 1014.00, downstream (feet) = 800.00
- Channel length thru subarea (feet) = 2690.00
- Channel slope = 0.0796
- Manning's factor = 0.060
- "Z" factor = 10.000
- Maximum depth (feet) = 5.00
- 100 year rainfall intensity (inch/hour) = 3.793
- Residential (1. Du/ac or less) runoff coefficient = 0.360
- Soil classification is "C"
- S.C.S. Curve number (AMC II) = 76
- Travel time computed using estimated flow (cfs) = 35.61
- Travel time thru subarea based on velocity (feet/sec.) = 3.82
- Average flow depth (feet) = 0.54
- Travel time (min.) = 11.74
- Tc (min.) = 19.82
- Subarea area (acres) = 49.80
- Subarea runoff (cfs) = 68.00
- Area-average runoff coefficient = 0.360
- Total area (acres) = 49.90
- Peak flow rate (cfs) = 68.11

End of subarea channel flow hydraulics:
- Depth (feet) = 0.75
- Flow velocity (feet/sec.) = 4.64
- Longest flowpath from node 124.00 to node 123.00 = 2740.00 feet.

Flow process from node 123.00 to node 123.00 is code = 1

DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE

AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES

- Total number of streams = 2
- Confluence values used for independent stream 2 are:
  - Time of concentration (min.) = 19.82
  - Rainfall intensity (inch/hr) = 3.79
  - Total stream area (acres) = 49.90
  - Peak flow rate (cfs) at confluence = 68.11

** Confluence Data **

<table>
<thead>
<tr>
<th>Stream Number</th>
<th>Runoff (CFS)</th>
<th>Tc (Min.)</th>
<th>Intensity (Inch/Hour)</th>
<th>Area (Acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20.99</td>
<td>12.95</td>
<td>4.991</td>
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<tr>
<td>2</td>
<td>68.11</td>
<td>19.82</td>
<td>3.793</td>
<td>49.90</td>
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</table>
RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>65.50</td>
<td>12.95</td>
<td>4.991</td>
</tr>
<tr>
<td>2</td>
<td>84.07</td>
<td>19.82</td>
<td>3.793</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 84.07  Tc (MIN.) = 19.82
TOTAL AREA (ACRES) = 61.60
LONGEST FLOWPATH FROM NODE 124.00 TO NODE 123.00 = 2740.00 FEET.

FLOW PROCESS FROM NODE 123.00 TO NODE 126.00 IS CODE = 51

ELEVATION DATA: UPSTREAM (FEET) = 800.00  DOWNSTREAM (FEET) = 787.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 542.00  CHANNEL SLOPE = 0.0240
CHANNEL BASE (FEET) = 10.00  "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH (FEET) = 5.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 3.554
LEGUMES (STRAIGHT ROW) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 81
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 86.25
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.29
AVERAGE FLOW DEPTH (FEET) = 1.54  TRAVEL TIME (MIN.) = 2.10
Tc (MIN.) = 21.93
SUBAREA AREA (ACRES) = 4.10  SUBAREA RUNOFF (CFS) = 4.37
AREA-AVERAGE RUNOFF COEFFICIENT = 0.356
TOTAL AREA (ACRES) = 65.70  PEAK FLOW RATE (CFS) = 84.07

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.51  FLOW VELOCITY (FEET/SEC.) = 4.26
LONGEST FLOWPATH FROM NODE 124.00 TO NODE 126.00 = 3282.00 FEET.

FLOW PROCESS FROM NODE 126.00 TO NODE 126.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 21.93
RAINFALL INTENSITY (INCH/HR) = 3.55
TOTAL STREAM AREA (ACRES) = 65.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 84.07

FLOW PROCESS FROM NODE 127.00 TO NODE 128.00 IS CODE = 21

LEGUMES (STRAIGHT ROW) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 81
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 898.00
DOWNSTREAM ELEVATION (FEET) = 896.00
ELEVATION DIFFERENCE (FEET) = 2.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 6.415
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.853
SUBAREA RUNOFF (CFS) = 0.24
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.24

FLOW PROCESS FROM NODE 128.00 TO NODE 126.00 IS CODE = 51

ELEVATION DATA: UPSTREAM (FEET) = 896.00 DOWNSTREAM (FEET) = 787.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 1470.00 CHANNEL SLOPE = 0.0741
CHANNEL BASE (FEET) = 25.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH (FEET) = 5.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.208
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 13.00
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 2.34
AVERAGE FLOW DEPTH (FEET) = 0.22 TRAVEL TIME (MIN.) = 10.46
Tc (MIN.) = 16.88
SUBAREA AREA (ACRES) = 15.90 SUBAREA RUNOFF (CFS) = 24.08
AREA-AVERAGE RUNOFF COEFFICIENT = 0.360
TOTAL AREA (ACRES) = 16.00 PEAK FLOW RATE (CFS) = 24.21

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.31 FLOW VELOCITY (FEET/SEC.) = 3.01
LONGEST FLOWPATH FROM NODE 127.00 TO NODE 126.00 = 1520.00 FEET.

FLOW PROCESS FROM NODE 126.00 TO NODE 126.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 16.88
RAINFALL INTENSITY (INCH/HR) = 4.21
TOTAL STREAM AREA (ACRES) = 16.00
PEAK FLOW RATE (CFS) AT CONFLUENCE = 24.21

** CONFLUENCE DATA **
<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>84.07</td>
<td>21.93</td>
<td>3.554</td>
<td>65.70</td>
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<tr>
<td>2</td>
<td>24.21</td>
<td>16.88</td>
<td>4.208</td>
<td>16.00</td>
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</table>

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

** PEAK FLOW RATE TABLE **
<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 104.52 Tc (MIN.) = 21.93
TOTAL AREA (ACRES) = 81.70
LONGEST FLOWPATH FROM NODE 124.00 TO NODE 126.00 = 3282.00 FEET.

FLOW PROCESS FROM NODE 126.00 TO NODE 129.00 IS CODE = 51

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 1

FLOW PROCESS FROM NODE 130.00 TO NODE 131.00 IS CODE = 21
SUBAREA RUNOFF (CFS) = 0.26
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.26

FLOW PROCESS FROM NODE 131.00 TO NODE 129.00 IS CODE = 51

>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<
>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<

ELEVATION DATA: UPSTREAM (FEET) = 962.00 DOWNSTREAM (FEET) = 720.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 3400.00 CHANNEL SLOPE = 0.0712
CHANNEL BASE (FEET) = 18.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH (FEET) = 5.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 3.416
LEGUMES (STRAIGHT ROW) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 81
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 32.22
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.58
AVERAGE FLOW DEPTH (FEET) = 0.45 TRAVEL TIME (MIN.) = 15.84
Tc (MIN.) = 23.32
SUBAREA AREA (ACRES) = 55.60 SUBAREA RUNOFF (CFS) = 56.97
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA (ACRES) = 55.70 PEAK FLOW RATE (CFS) = 57.10

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.62 FLOW VELOCITY (FEET/SEC.) = 4.36
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 129.00 = 3450.00 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 1

>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<
>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 23.32
RAINFALL INTENSITY (INCH/HR) = 3.42
TOTAL STREAM AREA (ACRES) = 55.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 57.10

** CONFLUENCE DATA **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>105.80</td>
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<td>3.178</td>
<td>95.50</td>
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<td>2</td>
<td>57.10</td>
<td>23.32</td>
<td>3.416</td>
<td>55.70</td>
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RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
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<tr>
<td>1</td>
<td>155.54</td>
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<td>3.416</td>
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<tr>
<td>2</td>
<td>158.93</td>
<td>26.07</td>
<td>3.178</td>
</tr>
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</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 158.93 Tc (MIN.) = 26.07
TOTAL AREA (ACRES) = 151.20
LONGEST FLOWPATH FROM NODE 124.00 TO NODE 129.00 = 4487.00 FEET.

FLOW PROCESS FROM NODE 129.00 TO NODE 118.00 IS CODE = 51

>>>.COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>.TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(Feet) = 720.00 DOWNSTREAM(Feet) = 636.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 770.00 CHANNEL SLOPE = 0.1091
CHANNEL BASE(Feet) = 12.00 "Z" FACTOR = 6.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH(Feet) = 5.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.048
CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 163.95
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/SEC.) = 7.35
AVERAGE FLOW DEPTH(Feet) = 1.17 TRAVEL TIME(MIN.) = 1.75
Tc(MIN.) = 27.82
SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 10.06
AREA-AVERAGE RUNOFF COEFFICIENT = 0.329
TOTAL AREA(ACRES) = 162.20 PEAK FLOW RATE(CFS) = 162.48

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 1.17 FLOW VELOCITY(Feet/SEC.) = 7.30
LONGEST FLOWPATH FROM NODE 124.00 TO NODE 118.00 = 5257.00 FEET.

** MAIN STREAM CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 162.48 27.82 3.048 162.20
LONGEST FLOWPATH FROM NODE 124.00 TO NODE 118.00 = 5257.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 211.84 24.96 3.269 206.30
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 118.00 = 6176.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 357.61 24.96 3.269
2 360.00 27.82 3.048
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 360.00 Tc(MIN.) = 27.82
TOTAL AREA(ACRES) = 368.50

FLOW PROCESS FROM NODE 118.00 TO NODE 118.00 IS CODE = 11

>>>.CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
** MAIN STREAM CONFLUENCE DATA **

<table>
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<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>360.00</td>
<td>27.82</td>
<td>3.048</td>
<td>368.50</td>
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LONGEST FLOWPATH FROM NODE 101.00 TO NODE 118.00 = 6176.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>36.03</td>
<td>15.48</td>
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LONGEST FLOWPATH FROM NODE 119.00 TO NODE 118.00 = 2155.00 FEET.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
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<tr>
<td>1</td>
<td>236.35</td>
<td>15.48</td>
<td>4.449</td>
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<tr>
<td>2</td>
<td>384.69</td>
<td>27.82</td>
<td>3.048</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 384.69  Tc (MIN.) = 27.82
TOTAL AREA (ACRES) = 395.50

FLOW PROCESS FROM NODE 118.00 TO NODE 118.00 IS CODE = 12

<<<<<<CLEAR MEMORY BANK # 1 <<<<<<

FLOW PROCESS FROM NODE 118.00 TO NODE 118.00 IS CODE = 12

<<<<<<CLEAR MEMORY BANK # 2 <<<<<<
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2012 Advanced Engineering Software (aes)
Ver. 19.0 Release Date: 06/01/2012 License ID 1503

Analysis prepared by:
LANDMARK CONSULTING
9555 GENESEE AVE. SUITE 200
SAN DIEGO, CA 92121
TEL: 858-587-8070, FAX: 858-587-8750

FILE NAME: 1037I1P.DAT
TIME/DATE OF STUDY: 10:23 01/23/2013

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA
USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 3.500
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>WIDTH</th>
<th>CROWN TO STREET-CROSSFALL</th>
<th>STREET-CROSSFALL</th>
<th>CURB GUTTER-GEOMETRIES: MANNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>0.020</td>
<td>0.020</td>
<td>0.020</td>
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</tbody>
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GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 5.0 (FT*FT/S)

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 21

>>>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(FEET) = 50.00
UPSTREAM ELEVATION(Feet) = 978.00
DOWNSTREAM ELEVATION(Feet) = 977.00
ELEVATION DIFFERENCE(Feet) = 1.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.657
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.515
SUBAREA RUNOFF(CFS) = 0.46
TOTAL AREA(ACRES) = 0.10  TOTAL RUNOFF(CFS) = 0.46

FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 51

>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<
>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<

ELEVATION DATA: UPSTREAM(Feet) = 977.00  DOWNSTREAM(Feet) = 894.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 1432.00  CHANNEL SLOPE = 0.0580
CHANNEL BASE(Feet) = 20.00  "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(Feet) = 2.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.216
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 13.97
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/SEC.) = 3.71
AVERAGE FLOW DEPTH(Feet) = 0.18  TRAVEL TIME(MIN.) = 6.44
Tc(MIN.) = 12.09
SUBAREA AREA(ACRES) = 13.10  SUBAREA RUNOFF(CFS) = 24.60
AREA-AVERAGE RUNOFF COEFFICIENT = 0.361
TOTAL AREA(ACRES) = 13.2  PEAK FLOW RATE(CFS) = 24.88

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.25  FLOW VELOCITY(Feet/SEC.) = 4.59
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 103.00 = 1482.00 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 31

>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 891.00  DOWNSTREAM(Feet) = 890.00
FLOW LENGTH(Feet) = 52.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.8 INCHES
PIPE-FLOW VELOCITY(Feet/SEC.) = 10.60
ESTIMATED PIPE DIAMETER(INCH) = 24.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.88
PIPE TRAVEL TIME(MIN.) = 0.08  Tc(MIN.) = 12.18
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 104.00 = 1534.00 FEET.

FLOW PROCESS FROM NODE 104.00 TO NODE 104.00 IS CODE = 1

>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 12.18
RAINFALL INTENSITY (INCH/HR) = 5.19
TOTAL STREAM AREA (ACRES) = 13.20
PEAK FLOW RATE (CFS) AT CONFLUENCE = 24.88

FLOW PROCESS FROM NODE 105.00 TO NODE 106.00 IS CODE = 21

RATIONAL METHOD INITIAL SUBAREA ANALYSIS

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 925.90
DOWNSTREAM ELEVATION (FEET) = 925.00
ELEVATION DIFFERENCE (FEET) = 0.90
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 5.859
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 8.325
SUBAREA RUNOFF (CFS) = 0.45
TOTAL AREA (ACRES) = 0.10  TOTAL RUNOFF (CFS) = 0.45

FLOW PROCESS FROM NODE 106.00 TO NODE 107.00 IS CODE = 62

COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA

UPSTREAM ELEVATION (FEET) = 922.00  DOWNSTREAM ELEVATION (FEET) = 912.00
STREET LENGTH (FEET) = 825.00  CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200
**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.99
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.36
HALFSTREET FLOOD WIDTH (FEET) = 11.68
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.69
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 0.97
STREET FLOW TRAVEL TIME (MIN.) = 5.11  Tc(MIN.) = 10.97
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.556
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA (ACRES) = 2.30  SUBAREA RUNOFF (CFS) = 6.90
TOTAL AREA (ACRES) = 2.4  PEAK FLOW RATE (CFS) = 7.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.42  HALF STREET FLOOD WIDTH (FEET) = 14.80
FLOW VELOCITY (FEET/SEC.) = 3.12  DEPTH*VELOCITY (FT*FT/SEC.) = 1.32
LONGEST FLOWPATH FROM NODE 105.00 TO NODE 107.00 = 875.00 FEET.

FLOW PROCESS FROM NODE 107.00 TO NODE 104.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<<>
>>> USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW) <<<<

ELEVATION DATA: UPSTREAM (FEET) = 906.00  DOWNSTREAM (FEET) = 890.00
FLOW LENGTH (FEET) = 231.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.4 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 12.66
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OFPIPES = 1
PIPE-FLOW (CFS) = 7.20
PIPE TRAVEL TIME (MIN.) = 0.30  Tc (MIN.) = 11.27
LONGEST FLOWPATH FROM NODE 105.00 TO NODE 104.00 = 1106.00 FEET.

FLOW PROCESS FROM NODE 104.00 TO NODE 104.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<<<
>>> AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES <<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 11.27
RAINFALL INTENSITY (INCH/HR) = 5.46
TOTAL STREAM AREA (ACRES) = 2.40
PEAK FLOW RATE (CFS) AT CONFLUENCE = 7.20

** CONFLUENCE DATA **
STREAM  RUNOFF  Tc  INTENSITY  AREA
NUMBER  (CFS)  (MIN.) (INCH/HOUR) (ACRE)
1  24.88  12.18  5.194  13.20
2  7.20  11.27  5.459  2.40

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

** PEAK FLOW RATE TABLE **
STREAM  RUNOFF  Tc  INTENSITY
NUMBER  (CFS)  (MIN.) (INCH/HOUR)
1  30.24  11.27  5.459
2  31.73  12.18  5.194

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 31.73  Tc (MIN.) = 12.18
TOTAL AREA (ACRES) = 15.6
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 104.00 = 1534.00 FEET.
FLOW PROCESS FROM NODE 104.00 TO NODE 108.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<
============================================================================
ELEVATION DATA: UPSTREAM(Feet) = 890.00 DOWNSTREAM(Feet) = 886.00
FLOW LENGTH(Feet) = 98.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.2 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 15.07
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.73
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 12.28
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 108.00 = 1632.00 FEET.

FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<
============================================================================
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 12.28
RAINFALL INTENSITY(INCH/HR) = 5.16
TOTAL STREAM AREA(ACRES) = 15.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 31.73

FLOW PROCESS FROM NODE 109.00 TO NODE 110.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
============================================================================
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(Feet) = 50.00
UPSTREAM ELEVATION(Feet) = 904.30
DOWNSTREAM ELEVATION(Feet) = 904.00
ELEVATION DIFFERENCE(Feet) = 0.30
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 8.451
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.573
SUBAREA RUNOFF(CFS) = 0.35
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.35

FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 62

>>> COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<
>>> (STREET TABLE SECTION # 1 USED)<<<
============================================================================
UPSTREAM ELEVATION(Feet) = 896.00 DOWNSTREAM ELEVATION(Feet) = 892.00
STREET LENGTH(Feet) = 390.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(Feet) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICITION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICITION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 2.58**

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.33
HALFSTREET FLOOD WIDTH (FEET) = 10.04
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.29
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 0.75
STREET FLOW TRAVEL TIME (MIN.) = 2.84  Tc (MIN.) = 11.29
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.453
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA (ACRES) = 1.50  SUBAREA RUNOFF (CFS) = 4.42
TOTAL AREA (ACRES) = 1.6  PEAK FLOW RATE (CFS) = 4.71

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.38  HALFSTREET FLOOD WIDTH (FEET) = 12.93
FLOW VELOCITY (FEET/SEC.) = 2.63  DEPTH * VELOCITY (FT*FT/SEC.) = 1.01
LONGEST FLOWPATH FROM NODE 109.00 TO NODE 111.00 = 440.00 FEET.

FLOW PROCESS FROM NODE 111.00 TO NODE 108.00 IS CODE = 31

FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 1

ELEVATION DATA: UPSTREAM (FEET) = 886.50  DOWNSTREAM (FEET) = 886.00
FLOW LENGTH (FEET) = 34.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.8 INCHES
PIPE FLOW VELOCITY (FEET/SEC.) = 6.42
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OF PIPES = 1
PIPE FLOW (CFS) = 4.71
PIPE TRAVEL TIME (MIN.) = 0.09  Tc (MIN.) = 11.38
LONGEST FLOWPATH FROM NODE 109.00 TO NODE 108.00 = 474.00 FEET.

FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 11.38
RAINFALL INTENSITY (INCH/HR) = 5.43
TOTAL STREAM AREA (ACRES) = 1.60
PEAK FLOW RATE (CFS) AT CONFLUENCE = 4.71

** CONFLUENCE DATA **
STREAM  RUNOFF  Tc  INTENSITY  AREA
NUMBER   (CFS)     (MIN.)     (INCH/HOUR)     (ACRE)

44
RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONfluence FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34.92</td>
<td>11.38</td>
<td>5.425</td>
</tr>
<tr>
<td>2</td>
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<td>5.164</td>
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COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 36.22  Tc (MIN.) = 12.28
TOTAL AREA (ACRES) = 17.2
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 108.00 = 1632.00 FEET.

FLOW PROCESS FROM NODE 108.00 TO NODE 112.00 IS CODE = 31

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34.92</td>
<td>11.38</td>
<td>5.425</td>
</tr>
<tr>
<td>2</td>
<td>36.22</td>
<td>12.28</td>
<td>5.164</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 36.22  Tc (MIN.) = 12.28
TOTAL AREA (ACRES) = 17.2
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 108.00 = 1632.00 FEET.

FLOW PROCESS FROM NODE 108.00 TO NODE 112.00 IS CODE = 31

** RATIONAL METHOD INITIAL SUBAREA ANALYSIS **
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 903.80
DOWNSTREAM ELEVATION (FEET) = 903.00
ELEVATION DIFFERENCE (FEET) = 0.80
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 6.094
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 8.117
SUBAREA RUNOFF (CFS) = 0.44
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.44

---------------------------------------------------------------------------------
FLOW PROCESS FROM NODE 114.00 TO NODE 115.00 IS CODE = 62

>>>>>>>>> COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA <<<<<<
>>>>>>>>> (STREET TABLE SECTION # 1 USED) <<<<<<

UPSTREAM ELEVATION (FEET) = 896.00 DOWNSTREAM ELEVATION (FEET) = 882.00
STREET LENGTH (FEET) = 380.00 CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

** TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.28
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.30
HALFSTREET FLOOD WIDTH (FEET) = 8.44
AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.95
PRODUCT OF DEPTH*VELOCITY (FT*FT/SEC.) = 1.16
STREET FLOW TRAVEL TIME (MIN.) = 1.60 Tc (MIN.) = 7.70
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.981
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5400
SUBAREA AREA (ACRES) = 1.50 SUBAREA RUNOFF (CFS) = 5.65
TOTAL AREA (ACRES) = 1.6 PEAK FLOW RATE (CFS) = 6.03

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.35 HALFSTREET FLOOD WIDTH (FEET) = 10.98
FLOW VELOCITY (FEET/SEC.) = 4.56 DEPTH*VELOCITY (FT*FT/SEC.) = 1.58
LONGEST FLOWPATH FROM NODE 113.00 TO NODE 115.00 = 430.00 FEET.

**---------------------------------------------------------------------------------
FLOW PROCESS FROM NODE 115.00 TO NODE 112.00 IS CODE = 31

>>>>>>>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<<<<
>>>>>>>>> USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW) <<<<<<

ELEVATION DATA: UPSTREAM (FEET) = 876.50 DOWNSTREAM (FEET) = 876.00
FLOW LENGTH (FEET) = 21.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 8.17
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 6.03
PIPE TRAVEL TIME (MIN.) = 0.04 Tc (MIN.) = 7.74
LONGEST FLOWPATH FROM NODE  113.00 TO NODE  112.00 = 451.00 FEET.

FLOW PROCESS FROM NODE  112.00 TO NODE  112.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  7.74
RAINFALL INTENSITY(INCH/HR) =  6.96
TOTAL STREAM AREA(ACRES) =  1.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =  6.03

FLOW PROCESS FROM NODE  116.00 TO NODE  117.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(FEET) = 50.00
UPSTREAM ELEVATION(FeET) =  912.00
DOWNSTREAM ELEVATION(FeET) =  911.00
ELEVATION DIFFERENCE(FeET) =  1.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.657
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.515
SUBAREA RUNOFF(CFS) = 0.46
TOTAL AREA(ACRES) = 0.10  TOTAL RUNOFF(CFS) = 0.46

FLOW PROCESS FROM NODE  117.00 TO NODE  118.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

UPSTREAM ELEVATION(FeET) =  911.00  DOWNSTREAM ELEVATION(FeET) =  883.00
STREET LENGTH(FeET) =  444.00  CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FeET) =  30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FeET) =  20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICITION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICITION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.23
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FeET) = 0.27
HALFSTREET FLOOD WIDTH(FeET) = 7.38
AVERAGE FLOW VELOCITY(FeET/SEC.) = 4.88
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.34
STREET FLOW TRAVEL TIME(MIN.) = 1.52  Tc(MIN.) = 7.17
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.306
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA(ACRES) = 1.40  SUBAREA RUNOFF(CFS) = 5.52
TOTAL AREA(ACRES) = 1.5  PEAK FLOW RATE(CFS) = 5.92

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.32  HALFSTREET FLOOD WIDTH(Feet) = 9.70
FLOW VELOCITY(Feet/Sec.) = 5.59  DEPTH*VELOCITY(FT*ft/SEC.) = 1.79
LONGEST FLOWPATH FROM NODE 116.00 TO NODE 118.00 = 494.00 FEET.

******************************************************************************
FLOW PROCESS FROM NODE 118.00 TO NODE 112.00 IS CODE = 31
******************************************************************************

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<
>>> USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW) <<<

ELEVATION DATA: UPSTREAM(Feet) = 878.00  DOWNSTREAM(Feet) = 876.00
FLOW LENGTH(Feet) = 25.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.00
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.6 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 12.63
ESTIMATED PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.92
PIPE TRAVEL TIME(MIN.) = 0.03  Tc(MIN.) = 7.21
LONGEST FLOWPATH FROM NODE 116.00 TO NODE 112.00 = 519.00 FEET.

******************************************************************************
FLOW PROCESS FROM NODE 112.00 TO NODE 112.00 IS CODE = 1
******************************************************************************

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<
>>> AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES <<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.21
RAINFALL INTENSITY(INCH/HR) = 7.28
TOTAL STREAM AREA(ACRES) = 1.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.92

** CONFLUENCE DATA **
STREAM   RUNOFF   Tc   INTENSITY   AREA
NUMBER   (CFS)   (MIN.) (INCH/HOUR) (ACRE)
1        36.22    12.49         5.109       17.20
2        6.03     7.74          6.956       1.60
3        5.92     7.21          7.284       1.50

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

** PEAK FLOW RATE TABLE **
STREAM   RUNOFF   Tc   INTENSITY
NUMBER   (CFS)   (MIN.) (INCH/HOUR)
1        36.93    7.21          7.284
2        38.28    7.74          6.956
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 44.80  Tc(MIN.) = 12.49
TOTAL AREA(ACRES) = 20.3
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 112.00 = 1838.00 FEET.

FLOW PROCESS FROM NODE 112.00 TO NODE 119.00 IS CODE = 31

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 10

FLOW PROCESS FROM NODE 120.00 TO NODE 121.00 IS CODE = 21

FLOW PROCESS FROM NODE 121.00 TO NODE 123.00 IS CODE = 51

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(Feet) = 50.00
UPSTREAM ELEVATION(Feet) = 990.00
DOWNSTREAM ELEVATION(Feet) = 989.00
ELEVATION DIFFERENCE(Feet) = 1.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.657
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.515
SUBAREA RUNOFF(CFS) = 0.46
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.46

FLOW PROCESS FROM NODE 121.00 TO NODE 123.00 IS CODE = 51

ELEVATION DATA: UPSTREAM(Feet) = 989.00 DOWNSTREAM(Feet) = 910.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 50.00 CHANNEL SLOPE = 1.5800
CHANNEL BASE(Feet) = 20.00 "Z" FACTOR = 10.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH(Feet) = 2.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.401
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.28
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 6.96
AVERAGE FLOW DEPTH(Feet) = 0.12 TRAVEL TIME(Min.) = 0.12
Tc(Min.) = 5.78
SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 33.57
AREA-AVERAGE RUNOFF COEFFICIENT = 0.362
TOTAL AREA(ACRES) = 11.2 PEAK FLOW RATE(CFS) = 34.02
END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.17 FLOW VELOCITY(Feet/Sec.) = 9.18
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 123.00 = 100.00 FEET.

FLOW PROCESS FROM NODE 123.00 TO NODE 124.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<

ELEVATION DATA: UPSTREAM(Feet) = 905.00 DOWNSTREAM(Feet) = 889.00
FLOW LENGTH(Feet) = 124.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.0 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 23.05
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.02
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 5.87
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 124.00 = 224.00 FEET.

FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.87
RAINFALL INTENSITY(INCH/HR) = 8.32
TOTAL STREAM AREA(ACRES) = 11.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 34.02

FLOW PROCESS FROM NODE 125.00 TO NODE 126.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS <<<

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(Feet) = 50.00
UPSTREAM ELEVATION(Feet) = 919.20
DOWNSTREAM ELEVATION(Feet) = 918.70
ELEVATION DIFFERENCE(Feet) = 0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.128
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.337
SUBAREA RUNOFF(CFS) = 0.40
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.40
FLOW PROCESS FROM NODE 126.00 TO NODE 124.00 IS CODE = 62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>> (STREET TABLE SECTION # 1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) = 916.00 DOWNSTREAM ELEVATION(FEET) = 894.00
STREET LENGTH(FEET) = 422.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200
**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.37
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.28
HALFSTREET FLOOD WIDTH(Feet) = 7.91
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.53
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.29
STREET FLOW TRAVEL TIME(MIN.) = 1.55 Tc(MIN.) = 8.68
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.461
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5400
SUBAREA AREA(ACRES) = 1.70 SUBAREA RUNOFF(CFS) = 5.93
TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 6.28
END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.33 HALFSTREET FLOOD WIDTH(Feet) = 10.43
FLOW VELOCITY(Feet/Sec.) = 5.21 DEPTH*VELOCITY(FT*FT/SEC.) = 1.74
LONGEST FLOWPATH FROM NODE 125.00 TO NODE 124.00 = 472.00 FEET.

FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>> AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 8.68
RAINFALL INTENSITY(INCH/HR) = 6.46
TOTAL STREAM AREA(ACRES) = 1.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.28
** CONFLUENCE DATA **
<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34.02</td>
<td>5.87</td>
<td>8.318</td>
<td>11.20</td>
</tr>
</tbody>
</table>

51
RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>38.27</td>
<td>5.87</td>
<td>8.318</td>
</tr>
<tr>
<td>2</td>
<td>32.71</td>
<td>8.68</td>
<td>6.461</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 38.27  Tc (MIN.) = 5.87
TOTAL AREA (ACRES) = 13.0
LONGEST FLOWPATH FROM NODE 125.00 TO NODE 124.00 = 472.00 FEET.

FLOW PROCESS FROM NODE 124.00 TO NODE 127.00 IS CODE = 31

ELEVATION DATA: UPSTREAM (FEET) = 889.00  DOWNSTREAM (FEET) = 888.60
FLOW LENGTH (FEET) = 36.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.0 INCHES
PIPE FLOW VELOCITY (FEET/SEC.) = 9.49
ESTIMATED PIPE DIAMETER (INCH) = 30.00  NUMBER OF PIPES = 1
PIPE FLOW (CFS) = 38.27
PIPE TRAVEL TIME (MIN.) = 0.06  Tc (MIN.) = 5.93
LONGEST FLOWPATH FROM NODE 125.00 TO NODE 127.00 = 508.00 FEET.

FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 5.93
RAINFALL INTENSITY (INCH/HR) = 8.26
TOTAL STREAM AREA (ACRES) = 13.00
PEAK FLOW RATE (CFS) AT CONFLUENCE = 38.27

FLOW PROCESS FROM NODE 128.00 TO NODE 129.00 IS CODE = 21

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 919.70
DOWNSTREAM ELEVATION (FEET) = 919.00
ELEVATION DIFFERENCE (FEET) = 0.70
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 6.371
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.887
**SUBAREA RUNOFF (CFS) = 0.43**
**TOTAL AREA (ACRES) = 0.10**
**TOTAL RUNOFF (CFS) = 0.43**

**FLOW PROCESS FROM NODE 129.00 TO NODE 127.00 IS CODE = 62**

**>>> COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA <<<**

**STREET TABLE SECTION # 1 USED**

**UPSTREAM ELEVATION (FEET) = 916.00**
**DOWNSTREAM ELEVATION (FEET) = 894.00**

**STREET LENGTH (FEET) = 422.00**
**CURB HEIGHT (INCHES) = 6.0**
**STREET HALFWIDTH (FEET) = 30.00**

**DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00**
**INSIDE STREET CROSSFALL (DECIMAL) = 0.020**
**OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020**

**SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1**
**STREET PARKWAY CROSSFALL (DECIMAL) = 0.020**

**Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150**
**Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200**

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 2.45**

**STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:**
**STREET FLOW DEPTH (FEET) = 0.26**
**HALFSTREET FLOOD WIDTH (FEET) = 6.78**
**AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.24**
**PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 11.11**
**STREET FLOW TRAVEL TIME (MIN.) = 1.66**
**Tc (MIN.) = 8.03**

**100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.794**
**RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400**
**SOIL CLASSIFICATION IS "C"**
**S.C.S. CURVE NUMBER (AMC II) = 84**
**AREA-AVERAGE RUNOFF COEFFICIENT = 0.540**

**SUBAREA AREA (ACRES) = 1.10**
**SUBAREA RUNOFF (CFS) = 4.04**

**TOTAL AREA (ACRES) = 1.2**
**PEAK FLOW RATE (CFS) = 4.40**

**END OF SUBAREA STREET FLOW HYDRAULICS:**
**DEPTH (FEET) = 0.30**
**HALFSTREET FLOOD WIDTH (FEET) = 8.90**
**FLOW VELOCITY (FEET/SEC.) = 4.83**
**DEPTH*VELOCITY (PT*FT/SEC.) = 14.70**
**LONGEST FLOWPATH FROM NODE 128.00 TO NODE 127.00 = 472.00 FEET.**

**TOTAL NUMBER OF STREAMS = 2**

**CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:**
**TIME OF CONCENTRATION (MIN.) = 8.03**
**RAINFALL INTENSITY (INCH/HR) = 6.79**
**TOTAL STREAM AREA (ACRES) = 1.20**
**PEAK FLOW RATE (CFS) AT CONFLUENCE = 4.40**

**CONFLUENCE DATA**

**STREAM RUNOFF Tc INTENSITY AREA**
RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM | RUNOFF (CFS) | Tc (MIN.) | INTENSITY (INCH/HOUR)
--- | --- | --- | ---
1 | 41.52 | 5.93 | 8.261
2 | 35.88 | 8.03 | 6.794

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 41.52
Tc (MIN.) = 5.93
TOTAL AREA (ACRES) = 14.2
LONGEST FLOWPATH FROM NODE 125.00 TO NODE 127.00 = 508.00 FEET.

FLOW PROCESS FROM NODE 127.00 TO NODE 130.00 IS CODE = 31

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 10

FLOW PROCESS FROM NODE 131.00 TO NODE 132.00 IS CODE = 21

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 890.00
DOWNSTREAM ELEVATION (FEET) = 889.50
ELEVATION DIFFERENCE (FEET) = 0.50
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 7.128
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.337
SUBAREA RUNOFF (CFS) = 0.40
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.40
FLOW PROCESS FROM NODE 132.00 TO NODE 133.00 IS CODE = 62

>>>><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><><>
DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 9.69
RAINFALL INTENSITY (INCH/HR) = 6.02
TOTAL STREAM AREA (ACRES) = 1.50
PEAK FLOW RATE (CFS) AT CONFLUENCE = 4.91

FLOW PROCESS FROM NODE 135.00 TO NODE 136.00 IS CODE = 21

RATIONAL METHOD INITIAL SUBAREA ANALYSIS

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 889.00
DOWNSTREAM ELEVATION (FEET) = 888.50
ELEVATION DIFFERENCE (FEET) = 0.50
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 7.128
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.337
SUBAREA RUNOFF (CFS) = 0.40
TOTAL AREA (ACRES) = 0.10
TOTAL RUNOFF (CFS) = 0.40

FLOW PROCESS FROM NODE 136.00 TO NODE 134.00 IS CODE = 62

COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA

UPSTREAM ELEVATION (FEET) = 888.00
DOWNSTREAM ELEVATION (FEET) = 886.00
STREET LENGTH (FEET) = 331.00
CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curdb = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200
**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 1.92
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.27
HALFSTREET FLOOD WIDTH (FEET) = 7.24
AVERAGE FLOW VELOCITY (FEET/SEC.) = 1.50
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 0.41
STREET FLOW TRAVEL TIME (MIN.) = 3.69
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.606
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA (ACRES) = 1.00  SUBAREA RUNOFF (CFS) = 3.03
TOTAL AREA (ACRES) = 1.1  PEAK FLOW RATE (CFS) = 3.33

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.31  HALF STREET FLOOD WIDTH (FEET) = 9.30
FLOW VELOCITY (FEET/SEC.) = 1.69  DEPTH*VELOCITY (FT*ft/SEC.) = 0.53
LONGEST FLOWPATH FROM NODE 135.00 TO NODE 134.00 = 381.00 FEET.

FLOW PROCESS FROM NODE 134.00 TO NODE 134.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<<<
>>> AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES <<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 10.82
RAINFALL INTENSITY (INCH/HR) = 5.61
TOTAL STREAM AREA (ACRES) = 1.10
PEAK FLOW RATE (CFS) AT CONFLUENCE = 3.33

** CONFLUENCE DATA **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.91</td>
<td>9.69</td>
<td>6.017</td>
<td>1.50</td>
</tr>
<tr>
<td>2</td>
<td>3.33</td>
<td>10.82</td>
<td>5.606</td>
<td>1.10</td>
</tr>
</tbody>
</table>

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

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7.89</td>
<td>9.69</td>
<td>6.017</td>
</tr>
<tr>
<td>2</td>
<td>7.90</td>
<td>10.82</td>
<td>5.606</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 7.90  Tc (MIN.) = 10.82
TOTAL AREA (ACRES) = 2.6
LONGEST FLOWPATH FROM NODE 131.00 TO NODE 134.00 = 414.00 FEET.

FLOW PROCESS FROM NODE 134.00 TO NODE 130.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<<<
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<<<

ELEVATION DATA: UPSTREAM (FEET) = 880.50  DOWNSTREAM (FEET) = 879.00
FLOW LENGTH (FEET) = 43.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 10.10
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 7.90
PIPE TRAVEL TIME (MIN.) = 0.07  Tc (MIN.) = 10.89
LONGEST FLOWPATH FROM NODE 131.00 TO NODE 130.00 = 457.00 FEET.
FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 11

>>> CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<

** MAIN STREAM CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 7.90 10.89 5.582 2.60
LONGEST FLOWPATH FROM NODE 131.00 TO NODE 130.00 = 457.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 41.52 6.26 7.973 14.20
LONGEST FLOWPATH FROM NODE 125.00 TO NODE 130.00 = 804.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 46.07 6.26 7.973
2 36.97 10.89 5.582

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 46.07 Tc (MIN.) = 6.26
TOTAL AREA (ACRES) = 16.8

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 12

>>> CLEAR MEMORY BANK # 2 <<<

FLOW PROCESS FROM NODE 130.00 TO NODE 119.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<

ELEVATION DATA: UPSTREAM (FEET) = 879.00 DOWNSTREAM (FEET) = 875.50
FLOW LENGTH (FEET) = 120.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.4 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 14.32
ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 46.07
PIPE TRAVEL TIME (MIN.) = 0.14 Tc (MIN.) = 6.40
LONGEST FLOWPATH FROM NODE 125.00 TO NODE 119.00 = 924.00 FEET.

FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 11

>>> CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY <<<

** MAIN STREAM CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER  (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
1       46.07     6.40       7.861       16.80
LONGEST FLOWPATH FROM NODE 125.00 TO NODE 119.00 = 924.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM   RUNOFF   Tc     INTENSITY    AREA
NUMBER    (CFS)    (MIN.)  (INCH/HOUR) (ACRE)
1         44.80    12.52    5.101       20.30
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 119.00 = 1861.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM   RUNOFF   Tc     INTENSITY
NUMBER    (CFS)    (MIN.)  (INCH/HOUR)
1         68.98    6.40     7.861
2         74.69    12.52    5.101

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 74.69   Tc (MIN.) = 12.52
TOTAL AREA (ACRES) = 37.1

******************************************************************************
FLOW PROCESS FROM NODE 119.00 TO NODE 119.00 IS CODE = 12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
******************************************************************************
FLOW PROCESS FROM NODE 119.00 TO NODE 137.00 IS CODE = 31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM (FEET) = 875.50 DOWNSTREAM (FEET) = 866.00
FLOW LENGTH (FEET) = 206.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.1 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 19.25
ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 74.69
PIPE TRAVEL TIME (MIN.) = 0.18   Tc (MIN.) = 12.70
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 137.00 = 2067.00 FEET.

******************************************************************************
FLOW PROCESS FROM NODE 137.00 TO NODE 137.00 IS CODE = 1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
============================================================================
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 12.70
RAINFALL INTENSITY (INCH/HR) = 5.05
TOTAL STREAM AREA (ACRES) = 37.10
PEAK FLOW RATE (CFS) AT CONFLUENCE = 74.69

******************************************************************************
FLOW PROCESS FROM NODE 138.00 TO NODE 139.00 IS CODE = 21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(Feet) = 50.00
UPSTREAM ELEVATION(Feet) = 919.40
DOWNSTREAM ELEVATION(Feet) = 918.90
ELEVATION DIFFERENCE(Feet) = 0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.128
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.337
SUBAREA RUNOFF(CFS) = 0.40
TOTAL AREA(ACRES) = 0.10  TOTAL RUNOFF(CFS) = 0.40

FLOW PROCESS FROM NODE 139.00 TO NODE 140.00 IS CODE = 62

>>><<< COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>><<< (STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(Feet) = 918.90  DOWNSTREAM ELEVATION(Feet) = 871.00
STREET LENGTH(Feet) = 633.00  CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(Feet) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.73
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.23
HALFSTREET FLOOD WIDTH(Feet) = 5.05
AVERAGE FLOW VELOCITY(Feet/Sec.) = 4.63
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.05
STREET FLOW TRAVEL TIME(MIN.) = 2.28  Tc(MIN.) = 9.41
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.134
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5400
SUBAREA AREA(ACRES) = 0.80  SUBAREA RUNOFF(CFS) = 2.65
TOTAL AREA(ACRES) = 0.9  PEAK FLOW RATE(CFS) = 2.98

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.26  HALFSTREET FLOOD WIDTH(Feet) = 6.78
FLOW VELOCITY(Feet/Sec.) = 5.16  DEPTH*VELOCITY(FT*FT/SEC.) = 1.35
LONGEST FLOWPATH FROM NODE 138.00 TO NODE 140.00 = 683.00 FEET.

FLOW PROCESS FROM NODE 140.00 TO NODE 137.00 IS CODE = 31

>>><<< COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>><<< USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
ELEVATION DATA: UPSTREAM(Feet) = 866.50 DOWNSTREAM(Feet) = 866.00
FLOW LENGTH(Feet) = 10.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.4 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 8.77
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.98
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 9.43
LONGEST FLOWPATH FROM NODE 138.00 TO NODE 137.00 = 693.00 FEET.

FLOW PROCESS FROM NODE 137.00 TO NODE 137.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.43
RAINFALL INTENSITY(INCH/HR) = 6.13
TOTAL STREAM AREA(ACRES) = 0.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.98

FLOW PROCESS FROM NODE 141.00 TO NODE 142.00 IS CODE = 21

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(Feet) = 50.00
UPSTREAM ELEVATION(Feet) = 877.00
DOWNSTREAM ELEVATION(Feet) = 876.50
ELEVATION DIFFERENCE(Feet) = 0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.128
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.337
SUBAREA RUNOFF(CFS) = 0.40
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.40

FLOW PROCESS FROM NODE 142.00 TO NODE 143.00 IS CODE = 62

UPSTREAM ELEVATION(Feet) = 876.00 DOWNSTREAM ELEVATION(Feet) = 871.00
STREET LENGTH(Feet) = 115.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(Feet) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.72**

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

- STREET FLOW DEPTH(FEET) = 0.24
- HALFSTREET FLOOD WIDTH(FEET) = 5.92
- AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.68
- PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.90
- STREET FLOW TRAVEL TIME(MIN.) = 0.52  Tc(MIN.) = 7.65

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.010

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 84

AREA-AVERAGE RUNOFF COEFFICIENT = 0.540

SUBAREA AREA(ACRES) = 0.70  SUBAREA RUNOFF(CFS) = 2.65

TOTAL AREA(ACRES) = 0.8  PEAK FLOW RATE(CFS) = 3.03

END OF SUBAREA STREET FLOW HYDRAULICS:

- DEPTH(FEET) = 0.28  HALFSTREET FLOOD WIDTH(FEET) = 7.84
- FLOW VELOCITY(FEET/SEC.) = 4.13  DEPTH*VELOCITY(FT*FT/SEC.) = 1.17
- LONGEST FLOWPATH FROM NODE 141.00 TO NODE 143.00 = 165.00 FEET.

ELEVATION DATA: UPSTREAM(FEET) = 866.50  DOWNSTREAM(FEET) = 866.00

FLOW LENGTH(FEET) = 34.00  MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 5.69  NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 3.03

LONGEST FLOWPATH FROM NODE 141.00 TO NODE 143.00 = 199.00 FEET.

END OF SUBAREA STREET FLOW HYDRAULICS:

** CONFLUENCE DATA **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>74.69</td>
<td>12.70</td>
<td>5.055</td>
<td>37.10</td>
</tr>
<tr>
<td>2</td>
<td>2.98</td>
<td>9.43</td>
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<td>3</td>
<td>3.03</td>
<td>7.75</td>
<td>6.952</td>
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</table>

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.95

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:

- TIME OF CONCENTRATION(MIN.) = 7.75
- RAINFALL INTENSITY(INCH/HR) = 6.95
- TOTAL STREAM AREA(ACRES) = 0.80
- PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.03
RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>51.05</td>
<td>7.75</td>
<td>6.952</td>
</tr>
<tr>
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</tr>
<tr>
<td>3</td>
<td>79.35</td>
<td>12.70</td>
<td>5.055</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 79.35  Tc (MIN.) = 12.70
TOTAL AREA (ACRES) = 38.8
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 137.00 = 2067.00 FEET.

FLOW PROCESS FROM NODE 137.00 TO NODE 144.00 IS CODE = 31

FLOW PROCESS FROM NODE 144.00 TO NODE 144.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 12.89
RAINFALL INTENSITY (INCH/HR) = 5.01
TOTAL STREAM AREA (ACRES) = 38.8
PEAK FLOW RATE (CFS) AT CONFLUENCE = 79.35

FLOW PROCESS FROM NODE 145.00 TO NODE 146.00 IS CODE = 21

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 914.00
DOWNSTREAM ELEVATION (FEET) = 913.50
ELEVATION DIFFERENCE (FEET) = 0.50
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 7.128
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.337
**SUBAREA RUNOFF (CFS) = 0.40**

**TOTAL AREA (ACRES) = 0.10** **TOTAL RUNOFF (CFS) = 0.40**

**FLOW PROCESS FROM NODE 146.00 TO NODE 147.00 IS CODE = 62**

**COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA**

**UPSTREAM ELEVATION (FEET) = 913.00** **DOWNSTREAM ELEVATION (FEET) = 872.00**

**STREET LENGTH (FEET) = 564.00** **CURB HEIGHT (INCHES) = 6.0**

**STREET HALFWIDTH (FEET) = 30.00**

**DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00**

**INSIDE STREET CROSSFALL (DECIMAL) = 0.020**

**OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020**

**SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1**

**STREET PARKWAY CROSSFALL (DECIMAL) = 0.020**

**Manning’s FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150**

**Manning’s FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200**

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.49**

**STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:**

**STREET FLOW DEPTH (FEET) = 0.28**

**HALFSTREET FLOOD WIDTH (FEET) = 7.44**

**AVERAGE FLOW VELOCITY (FEET/SEC.) = 5.20**

**PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 1.43**

**STREET FLOW TRAVEL TIME (MIN.) = 1.81** **Tc(MIN.) = 8.94**

**100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.341**

**RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400**

**SOIL CLASSIFICATION IS "C"**

**S.C.S. CURVE NUMBER (AMC II) = 84**

**AREA-AVERAGE RUNOFF COEFFICIENT = 0.5400**

**SUBAREA AREA (ACRES) = 1.80** **SUBAREA RUNOFF (CFS) = 6.16**

**TOTAL AREA (ACRES) = 1.9** **PEAK FLOW RATE (CFS) = 6.51**

**END OF SUBAREA STREET FLOW HYDRAULICS:**

**DEPTH (FEET) = 0.32** **HALFSTREET FLOOD WIDTH (FEET) = 9.83**

**FLOW VELOCITY (FEET/SEC.) = 5.99** **DEPTH*VELOCITY (PT*FT/SEC.) = 1.94**

**LONGEST FLOWPATH FROM NODE 145.00 TO NODE 147.00 = 614.00 FEET.**

**FLOW PROCESS FROM NODE 147.00 TO NODE 144.00 IS CODE = 31**

**COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA**

**ELEVATION DATA: UPSTREAM (FEET) = 867.00** **DOWNSTREAM (FEET) = 864.00**

**FLOW LENGTH (FEET) = 15.00** **MANNING’S N = 0.013**

**ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000**

**DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.6 INCHES**

**PIPE-FLOW VELOCITY (FEET/SEC.) = 18.00**

**ESTIMATED PIPE DIAMETER (INCH) = 18.00** **NUMBER OF PIPES = 1**

**PIPE-FLOW (CFS) = 6.51**

**PIPE TRAVEL TIME (MIN.) = 0.01** **Tc(MIN.) = 8.95**

**LONGEST FLOWPATH FROM NODE 145.00 TO NODE 144.00 = 629.00 FEET.**
FLOW PROCESS FROM NODE 144.00 TO NODE 144.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE
>>> AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 8.95
RAINFALL INTENSITY (INCH/HR) = 6.33
TOTAL STREAM AREA (ACRES) = 1.90
PEAK FLOW RATE (CFS) AT CONFLUENCE = 6.51

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 79.35 12.89 5.007 38.80
2 6.51 8.95 6.334 1.90

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 69.22 8.95 6.334
2 84.50 12.89 5.007

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 84.50 Tc (MIN.) = 13.02
TOTAL AREA (ACRES) = 40.7
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 144.00 = 2210.00 FEET.

FLOW PROCESS FROM NODE 144.00 TO NODE 148.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)

ELEVATION DATA: UPSTREAM (FEET) = 864.00 DOWNSTREAM (FEET) = 845.00
FLOW LENGTH (FEET) = 199.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 25.94
ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 84.50
PIPE TRAVEL TIME (MIN.) = 0.13 Tc (MIN.) = 13.02
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 148.00 = 2409.00 FEET.

FLOW PROCESS FROM NODE 148.00 TO NODE 148.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 13.02
RAINFALL INTENSITY (INCH/HR) = 4.97
TOTAL STREAM AREA (ACRES) = 40.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 84.50

FLOW PROCESS FROM NODE 149.00 TO NODE 150.00 IS CODE = 21

>>>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS <<<<<

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 919.40
DOWNSTREAM ELEVATION (FEET) = 918.90
ELEVATION DIFFERENCE (FEET) = 0.50
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.337
SUBAREA RUNOFF (CFS) = 0.40
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.40

FLOW PROCESS FROM NODE 150.00 TO NODE 151.00 IS CODE = 62

>>>>> COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA <<<<<

UPSTREAM ELEVATION (FEET) = 916.00 DOWNSTREAM ELEVATION (FEET) = 896.00
STREET LENGTH (FEET) = 370.00 CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICITION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICITION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 4.14
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.30
HALFSTREET FLOOD WIDTH (FEET) = 8.57
AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.86
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 1.45
STREET FLOW TRAVEL TIME (MIN.) = 1.27 Tc(MIN.) = 8.40
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.601
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA (ACRES) = 2.10 SUBAREA RUNOFF (CFS) = 7.49
TOTAL AREA (ACRES) = 2.2 PEAK FLOW RATE (CFS) = 7.84

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.35 HALFSTREET FLOOD WIDTH (FEET) = 11.37
FLOW VELOCITY (FEET/SEC.) = 5.56  DEPTH*VELOCITY (FT*ft/SEC.) = 1.97
LONGEST FLOWPATH FROM NODE 149.00 TO NODE 151.00 = 420.00 FEET.

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FLOW PROCESS FROM NODE 151.00 TO NODE 152.00 IS CODE = 31

>>>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<<<

ELEVATION DATA: UPSTREAM (FEET) = 891.00  DOWNSTREAM (FEET) = 890.00
FLOW LENGTH (FEET) = 100.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 6.24
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 7.84
PIPE TRAVEL TIME (MIN.) = 0.27  Tc (MIN.) = 8.66
LONGEST FLOWPATH FROM NODE 149.00 TO NODE 152.00 = 520.00 FEET.

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FLOW PROCESS FROM NODE 152.00 TO NODE 153.00 IS CODE = 51

>>>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW <<<<<

ELEVATION DATA: UPSTREAM (FEET) = 890.00  DOWNSTREAM (FEET) = 850.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 730.00  CHANNEL SLOPE = 0.0548
CHANNEL BASE (FEET) = 2.00  "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.015  MAXIMUM DEPTH (FEET) = 2.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.967
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = 0.5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 9.94
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 10.54
AVERAGE FLOW DEPTH (FEET) = 0.39  TRAVEL TIME (MIN.) = 1.15
Tc (MIN.) = 9.82
SUBAREA AREA (ACRES) = 1.30  SUBAREA RUNOFF (CFS) = 4.19
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
TOTAL AREA (ACRES) = 3.5  PEAK FLOW RATE (CFS) = 11.28

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.42  FLOW VELOCITY (FEET/SEC.) = 10.96
LONGEST FLOWPATH FROM NODE 149.00 TO NODE 153.00 = 1250.00 FEET.

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FLOW PROCESS FROM NODE 153.00 TO NODE 148.00 IS CODE = 31

>>>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<<<

ELEVATION DATA: UPSTREAM (FEET) = 846.00  DOWNSTREAM (FEET) = 845.00
FLOW LENGTH (FEET) = 100.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 6.86
ESTIMATED PIPE DIAMETER (INCH) = 21.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 11.28
PIPE TRAVEL TIME (MIN.) = 0.24  Tc (MIN.) = 10.06
LONGEST FLOWPATH FROM NODE 149.00 TO NODE 148.00 = 1350.00 FEET.

FLOW PROCESS FROM NODE 148.00 TO NODE 148.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<
>>> AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES <<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 10.06
RAINFALL INTENSITY (INCH/HR) = 5.87
TOTAL STREAM AREA (ACRES) = 3.50
PEAK FLOW RATE (CFS) AT CONFLUENCE = 11.28

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 84.50 13.02 4.975 40.70
2 11.28 10.06 5.874 3.50

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 82.84 10.06 5.874
2 94.05 13.02 4.975

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 94.05 Tc (MIN.) = 13.02
TOTAL AREA (ACRES) = 44.2
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 148.00 = 2409.00 FEET.

FLOW PROCESS FROM NODE 148.00 TO NODE 154.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<

ELEVATION DATA: UPSTREAM (FEET) = 845.00 DOWNSTREAM (FEET) = 821.00
FLOW LENGTH (FEET) = 272.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 26.24
ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 94.05
PIPE TRAVEL TIME (MIN.) = 0.17 Tc (MIN.) = 13.19
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 154.00 = 2681.00 FEET.

FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 13.19
RAINFALL INTENSITY (INCH/HR) = 4.93
TOTAL STREAM AREA (ACRES) = 44.20
PEAK FLOW RATE (CFS) AT CONFLUENCE = 94.05

FLOW PROCESS FROM NODE 155.00 TO NODE 156.00 IS CODE = 21

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 884.00
DOWNSTREAM ELEVATION (FEET) = 880.00
ELEVATION DIFFERENCE (FEET) = 4.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 1.464
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF (CFS) = 0.80
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.80

FLOW PROCESS FROM NODE 156.00 TO NODE 157.00 IS CODE = 62

UPSTREAM ELEVATION (FEET) = 880.00 DOWNSTREAM ELEVATION (FEET) = 828.00
STREET LENGTH (FEET) = 1237.00 CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 12.01
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.41
HALFSTREET FLOOD WIDTH (FEET) = 14.18
AVERAGE FLOW VELOCITY (FEET/SEC.) = 5.64
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 2.31
STREET FLOW TRAVEL TIME (MIN.) = 3.66 Tc (MIN.) = 5.12
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 9.083
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.547
SUBAREA AREA (ACRES) = 4.50 SUBAREA RUNOFF (CFS) = 22.07
TOTAL AREA (ACRES) = 4.6 PEAK FLOW RATE (CFS) = 22.86
END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.49  HALF STREET FLOOD WIDTH (FEET) = 18.32
FLOW VELOCITY (FEET/SEC.) = 6.58  DEPTH*VELOCITY (FT*FT/SEC.) = 3.24
LONGEST FLOWPATH FROM NODE 155.00 TO NODE 157.00 = 1287.00 FEET.

FLOW PROCESS FROM NODE 157.00 TO NODE 154.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA

FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 5.16
RAINFALL INTENSITY (INCH/HR) = 9.04
TOTAL STREAM AREA (ACRES) = 4.60
PEAK FLOW RATE (CFS) AT CONFLUENCE = 22.86

** CONFLUENCE DATA **

<table>
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<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
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<td>1</td>
<td>94.05</td>
<td>13.19</td>
<td>4.933</td>
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<td>2</td>
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<td>5.16</td>
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RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>5.16</td>
<td>9.038</td>
</tr>
<tr>
<td>2</td>
<td>106.52</td>
<td>13.19</td>
<td>4.933</td>
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</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 106.52  Tc (MIN.) = 13.19
TOTAL AREA (ACRES) = 48.8
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 154.00 = 2681.00 FEET.

FLOW PROCESS FROM NODE 154.00 TO NODE 159.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA

70
USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)

ELEVATION DATA: UPSTREAM (FEET) = 821.00 DOWNSTREAM (FEET) = 820.30
FLOW LENGTH (FEET) = 64.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 12.27
ESTIMATED PIPE DIAMETER (INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 106.52
PIPE TRAVEL TIME (MIN.) = 0.09 Tc (MIN.) = 13.28
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 159.00 = 2745.00 FEET.

FLOW PROCESS FROM NODE 159.00 TO NODE 159.00 IS CODE = 10

MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1

FLOW PROCESS FROM NODE 160.00 TO NODE 161.00 IS CODE = 21

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 874.00
DOWNSTREAM ELEVATION (FEET) = 864.00
ELEVATION DIFFERENCE (FEET) = 10.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 1.359
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.0%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF (CFS) = 0.80
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.80

FLOW PROCESS FROM NODE 161.00 TO NODE 162.00 IS CODE = 62

COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA

STREET FLOW MODEL RESULTS USING ESTIMATED FLOW (CFS) = 5.84
STREET FLOW DEPTH (FEET) = 0.35
HALF STREET FLOOD WIDTH (FEET) = 11.13
AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.30
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 1.50
STREET FLOW TRAVEL TIME (MIN.) = 3.98  Tc (MIN.) = 5.34
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 8.837
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
SUBAREA AREA (ACRES) = 1.30  SUBAREA RUNOFF (CFS) = 9.99
TOTAL AREA (ACRES) = 1.4  PEAK FLOW RATE (CFS) = 10.76

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.41  HALF STREET FLOOD WIDTH (FEET) = 14.26
FLOW VELOCITY (FEET/SEC.) = 5.00  DEPTH*VELOCITY (FT*FT/SEC.) = 2.06
LONGEST FLOWPATH FROM NODE 160.00 TO NODE 162.00 = 1078.00 FEET.

FLOW PROCESS FROM NODE 162.00 TO NODE 159.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<<
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<<
ELEVATION DATA: UPSTREAM (FEET) = 824.00  DOWNSTREAM (FEET) = 820.30
FLOW LENGTH (FEET) = 98.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 11.24
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 10.76
PIPE TRAVEL TIME (MIN.) = 0.15  Tc (MIN.) = 5.49
LONGEST FLOWPATH FROM NODE 160.00 TO NODE 159.00 = 1176.00 FEET.

FLOW PROCESS FROM NODE 159.00 TO NODE 159.00 IS CODE = 10

>>> MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<

FLOW PROCESS FROM NODE 163.00 TO NODE 164.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS <<<<

CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 978.00
DOWNSTREAM ELEVATION (FEET) = 976.00
ELEVATION DIFFERENCE (FEET) = 2.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 6.415
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.853
SUBAREA RUNOFF (CFS) = 0.24
TOTAL AREA (ACRES) = 0.10  TOTAL RUNOFF (CFS) = 0.24
FLOW PROCESS FROM NODE 164.00 TO NODE 165.00 IS CODE = 51

>>>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW <<<<<
>>>>> TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT) <<<<<
============================================================================
ELEVATION DATA: UPSTREAM (FEET) = 976.00 DOWNSTREAM (FEET) = 910.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 433.00 CHANNEL SLOPE = 0.1524
CHANNEL BASE (FEET) = 10.00 "Z" FACTOR = 20.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH (FEET) = 2.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.677
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 1.62
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 1.72
AVERAGE FLOW DEPTH (FEET) = 0.08 TRAVEL TIME (MIN.) = 4.19
Tc (MIN.) = 10.61
SUBAREA AREA (ACRES) = 1.60 SUBAREA RUNOFF (CFS) = 2.73
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA (ACRES) = 1.7 PEAK FLOW RATE (CFS) = 2.90

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.12 FLOW VELOCITY (FEET/SEC.) = 2.00
LONGEST FLOWPATH FROM NODE 163.00 TO NODE 165.00 = 483.00 FEET.

FLOW PROCESS FROM NODE 165.00 TO NODE 166.00 IS CODE = 51

>>>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW <<<<<
>>>>> TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT) <<<<<
============================================================================
ELEVATION DATA: UPSTREAM (FEET) = 910.00 DOWNSTREAM (FEET) = 898.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 25.00 CHANNEL SLOPE = 0.4800
CHANNEL BASE (FEET) = 3.00 "Z" FACTOR = 0.100
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH (FEET) = 0.50
CHANNEL FLOW THRU SUBAREA (CFS) = 2.90
FLOW VELOCITY (FEET/SEC.) = 12.16 FLOW DEPTH (FEET) = 0.08
TRAVEL TIME (MIN.) = 0.03 Tc (MIN.) = 10.64
LONGEST FLOWPATH FROM NODE 163.00 TO NODE 166.00 = 508.00 FEET.

FLOW PROCESS FROM NODE 166.00 TO NODE 167.00 IS CODE = 62

>>>>> COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA <<<<<
>>>>> (STREET TABLE SECTION # 1 USED) <<<<<
============================================================================
UPSTREAM ELEVATION (FEET) = 898.00 DOWNSTREAM ELEVATION (FEET) = 876.00
STREET LENGTH (FEET) = 360.00 CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICITION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICITION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.89**

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 9.77
AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.49
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.77
STREET FLOW TRAVEL TIME(MIN.) = 1.09  Tc(MIN.) = 11.73

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.319
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
AREA-AVERAGE RUNOFF COEFFICIENT = 0.547
SUBAREA AREA(ACRES) = 1.30  SUBAREA RUNOFF(CFS) = 6.02
TOTAL AREA(ACRES) = 3.0  PEAK FLOW RATE(CFS) = 8.73

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36  HALFSTREET FLOOD WIDTH(FEET) = 11.52
FLOW VELOCITY(FEET/SEC.) = 6.04  DEPTH*VELOCITY(FT*FT/SEC.) = 2.15
LONGEST FLOWPATH FROM NODE 163.00 TO NODE 167.00 = 1090.00 FEET.

**FLOW PROCESS FROM NODE 167.00 TO NODE 168.00 IS CODE = 31**

>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<

>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<

ELEVATION DATA: UPSTREAM(FEET) = 870.00  DOWNSTREAM(FEET) = 863.00
FLOW LENGTH(FEET) = 222.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.98
ESTIMATED PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.73
PIPE TRAVEL TIME(MIN.) = 0.37  Tc(MIN.) = 12.10
LONGEST FLOWPATH FROM NODE 163.00 TO NODE 168.00 = 1090.00 FEET.

**FLOW PROCESS FROM NODE 168.00 TO NODE 170.00 IS CODE = 21**

>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<

**FLOW PROCESS FROM NODE 169.00 TO NODE 170.00 IS CODE = 21**

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<

CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
INITIAL SUBAREA FLOW-LENGTH(FEET) = 50.00
UPSTREAM ELEVATION(FEET) = 934.00
DOWNSTREAM ELEVATION(FEET) = 930.00
ELEVATION DIFFERENCE(FEET) = 4.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 5.092
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 9.114
SUBAREA RUNOFF (CFS) = 0.27
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.27

FLOW PROCESS FROM NODE 170.00 TO NODE 171.00 IS CODE = 51

>>>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW <<<<<

ELEVATION DATA: UPSTREAM (FEET) = 930.00 DOWNSTREAM (FEET) = 902.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 274.00 CHANNEL SLOPE = 0.1022
CHANNEL BASE (FEET) = 10.00 "Z" FACTOR = 20.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH (FEET) = 2.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.323
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 0.96
AVERAGE FLOW DEPTH (FEET) = 0.07 TRAVEL TIME (MIN.) = 3.88
Tc (MIN.) = 8.98
SUBAREA AREA (ACRES) = 0.70 SUBAREA RUNOFF (CFS) = 1.33
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA (ACRES) = 0.8 PEAK FLOW RATE (CFS) = 1.52

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.09 FLOW VELOCITY (FEET/SEC.) = 1.45
LONGEST FLOWPATH FROM NODE 169.00 TO NODE 171.00 = 324.00 FEET.

FLOW PROCESS FROM NODE 171.00 TO NODE 172.00 IS CODE = 31

>>>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<<<

ELEVATION DATA: UPSTREAM (FEET) = 900.00 DOWNSTREAM (FEET) = 898.80
FLOW LENGTH (FEET) = 121.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 4.07
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 1.52
PIPE TRAVEL TIME (MIN.) = 0.50 Tc (MIN.) = 9.47
LONGEST FLOWPATH FROM NODE 169.00 TO NODE 172.00 = 445.00 FEET.

FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 IS CODE = 1

>>>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 9.47
RAINFALL INTENSITY (INCH/HR) = 6.11
TOTAL STREAM AREA (ACRES) = 0.80
PEAK FLOW RATE (CFS) AT CONFLUENCE = 1.52

FLOW PROCESS FROM NODE 173.00 TO NODE 174.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS <<<

CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 940.00
DOWNSTREAM ELEVATION (FEET) = 938.00
ELEVATION DIFFERENCE (FEET) = 2.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 6.415
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.853
SUBAREA RUNOFF (CFS) = 0.24
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.24

FLOW PROCESS FROM NODE 174.00 TO NODE 172.00 IS CODE = 51

>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW <<<

ELEVATION DATA: UPSTREAM (FEET) = 938.00 DOWNSTREAM (FEET) = 908.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 863.00 CHANNEL SLOPE = 0.0348
CHANNEL BASE (FEET) = 2.00 "Z" FACTOR = 1.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH (FEET) = 2.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.381
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 2.75
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.91
AVERAGE FLOW DEPTH (FEET) = 0.21 TRAVEL TIME (MIN.) = 2.43
Tc (MIN.) = 8.85
SUBAREA AREA (ACRES) = 2.60 SUBAREA RUNOFF (CFS) = 4.98
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA (ACRES) = 2.7 PEAK FLOW RATE (CFS) = 5.17

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.31 FLOW VELOCITY (FEET/SEC.) = 7.27
LONGEST FLOWPATH FROM NODE 173.00 TO NODE 172.00 = 913.00 FEET.

FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 8.85
RAINFALL INTENSITY (INCH/HR) = 6.38
TOTAL STREAM AREA (ACRES) = 2.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 5.17
** CONFLUENCE DATA **

<table>
<thead>
<tr>
<th>STREAM</th>
<th>RUNOFF</th>
<th>Tc</th>
<th>INTENSITY</th>
<th>AREA</th>
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<td>NUMBER</td>
<td>(CFS)</td>
<td>(MIN.)</td>
<td>(INCH/HOUR)</td>
<td>(ACRE)</td>
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<td>0.80</td>
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<td>8.85</td>
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RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM</th>
<th>RUNOFF</th>
<th>Tc</th>
<th>INTENSITY</th>
</tr>
</thead>
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<tr>
<td>NUMBER</td>
<td>(CFS)</td>
<td>(MIN.)</td>
<td>(INCH/HOUR)</td>
</tr>
<tr>
<td>1</td>
<td>6.59</td>
<td>8.85</td>
<td>6.381</td>
</tr>
<tr>
<td>2</td>
<td>6.46</td>
<td>9.47</td>
<td>6.108</td>
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</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 6.59  Tc (MIN.) = 8.85
TOTAL AREA (ACRES) = 3.5
LONGEST FLOWPATH FROM NODE 173.00 TO NODE 172.00 = 913.00 FEET.

FLOW PROCESS FROM NODE 172.00 TO NODE 175.00 IS CODE = 31

ELEVATION DATA: UPSTREAM (FEET) = 898.80  DOWNSTREAM (FEET) = 897.60
FLOW LENGTH (FEET) = 112.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.4 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 6.19
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 6.59
PIPE TRAVEL TIME (MIN.) = 0.30  Tc (MIN.) = 9.15
LONGEST FLOWPATH FROM NODE 173.00 TO NODE 175.00 = 1025.00 FEET.

FLOW PROCESS FROM NODE 175.00 TO NODE 175.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 9.15
RAINFALL INTENSITY (INCH/HR) = 6.24
TOTAL STREAM AREA (ACRES) = 3.50
PEAK FLOW RATE (CFS) AT CONFLUENCE = 6.59

FLOW PROCESS FROM NODE 176.00 TO NODE 177.00 IS CODE = 21

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) =  930.70
DOWNSTREAM ELEVATION (FEET) =  930.00
ELEVATION DIFFERENCE (FEET) = 0.70
100 YEAR RAINFALL INTENSITY (INCH/HOUR) =  7.887
SUBAREA RUNOFF (CFS) =  0.43
TOTAL AREA (ACRES) =  0.10  TOTAL RUNOFF (CFS) =  0.43

FLOW PROCESS FROM NODE  177.00 TO NODE  175.00 IS CODE =  62

FLOW PROCESS FROM NODE  175.00 TO NODE  175.00 IS CODE =   1

TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION (MIN.) =  11.56
RAINFALL INTENSITY (INCH/HR) =  5.37
TOTAL STREAM AREA (ACRES) = 4.60
PEAK FLOW RATE (CFS) AT CONFLUENCE = 13.34

** CONFLUENCE DATA **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
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<tr>
<td>1</td>
<td>6.59</td>
<td>9.15</td>
<td>6.245</td>
<td>3.50</td>
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<tr>
<td>2</td>
<td>13.34</td>
<td>11.56</td>
<td>5.371</td>
<td>4.60</td>
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</tbody>
</table>

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

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17.15</td>
<td>9.15</td>
<td>6.245</td>
</tr>
<tr>
<td>2</td>
<td>19.01</td>
<td>11.56</td>
<td>5.371</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 19.01  Tc (MIN.) = 11.56
TOTAL AREA (ACRES) = 8.1
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 175.00 = 1250.00 FEET.

FLOW PROCESS FROM NODE 175.00 TO NODE 178.00 IS CODE = 62

UPSTREAM ELEVATION (FEET) = 888.00  DOWNSTREAM ELEVATION (FEET) = 870.00
STREET LENGTH (FEET) = 395.00  CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 22.58
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.48
HALFSTREET FLOOD WIDTH (FEET) = 17.93
AVERAGE FLOW VELOCITY (FEET/SEC.) = 6.78
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 3.29
STREET FLOW TRAVEL TIME (MIN.) = 0.97  Tc (MIN.) = 12.53
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.098
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = 0.5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.461
SUBAREA AREA (ACRES) = 2.60  SUBAREA RUNOFF (CFS) = 7.16
TOTAL AREA (ACRES) = 10.7  PEAK FLOW RATE (CFS) = 25.18
END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.50  HALFSTREET FLOOD WIDTH(Feet) = 18.73
FLOW VELOCITY(Feet/Sec.) = 6.96  DEPTH*VELOCITY(FT*ft/Sec.) = 3.48
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 178.00 = 1645.00 FEET.

FLOW PROCESS FROM NODE 178.00 TO NODE 179.00 IS CODE = 31

FLOW PROCESS FROM NODE 179.00 TO NODE 179.00 IS CODE = 1

FLOW PROCESS FROM NODE 180.00 TO NODE 181.00 IS CODE = 21

FLOW PROCESS FROM NODE 181.00 TO NODE 179.00 IS CODE = 62

FLOW PROCESS FROM NODE 180.00 TO NODE 181.00 IS CODE = 21

FLOW PROCESS FROM NODE 181.00 TO NODE 179.00 IS CODE = 62

FLOW PROCESS FROM NODE 179.00 TO NODE 179.00 IS CODE = 1

FLOW PROCESS FROM NODE 178.00 TO NODE 179.00 IS CODE = 31

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 12.63
RAINFALL INTENSITY(INCH/HR) = 5.07
TOTAL STREAM AREA(ACRES) = 10.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 25.18

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(Feet) = 50.00
UPSTREAM ELEVATION(Feet) = 931.00
DOWNSTREAM ELEVATION(Feet) = 930.50
ELEVATION DIFFERENCE(Feet) = 0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.128
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.337
SUBAREA RUNOFF(CFS) = 0.40
TOTAL AREA(ACRES) = 0.10  TOTAL RUNOFF(CFS) = 0.40

UPSTREAM ELEVATION(Feet) = 930.00  DOWNSTREAM ELEVATION(Feet) = 870.00
STREET LENGTH(Feet) = 1399.00  CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

** TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 6.49
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.35
HALFSTREET FLOOD WIDTH (FEET) = 10.98
AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.91
PRODUCT OF DEPTH VELOCITY (FT FT/SEC.) = 1.70
STREET FLOW TRAVEL TIME (MIN.) = 4.75 Tc (MIN.) = 11.88
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.277
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400

SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA (ACRES) = 4.20 SUBAREA RUNOFF (CFS) = 11.97
TOTAL AREA (ACRES) = 4.3 PEAK FLOW RATE (CFS) = 12.25

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.41 HALFSTREET FLOOD WIDTH (FEET) = 14.26
FLOW VELOCITY (FEET/SEC.) = 5.70 DEPTH VELOCITY (FT FT/SEC.) = 2.34
LONGEST FLOWPATH FROM NODE 180.00 TO NODE 179.00 = 1449.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE 179.00 TO NODE 179.00 IS CODE = 1
----------------------------------------------------------------------------
>>>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<<<
>>>>> AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES <<<<<
============================================================================
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 11.88
RAINFALL INTENSITY (INCH/HR) = 5.28
TOTAL STREAM AREA (ACRES) = 4.30
PEAK FLOW RATE (CFS) AT CONFLUENCE = 12.25

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 25.18 12.63 5.072 10.70
2 12.25 11.88 5.277 4.30

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 36.45 11.88 5.277
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 36.95  Tc (MIN.) = 12.63
TOTAL AREA (ACRES) = 15.0
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 179.00 = 1695.00 FEET.

FLOW PROCESS FROM NODE 179.00 TO NODE 168.00 IS CODE = 31

FLOW PROCESS FROM NODE 168.00 TO NODE 168.00 IS CODE = 11

** MAIN STREAM CONFLUENCE DATA **
STREAM   RUNOFF   Tc     INTENSITY   AREA
NUMBER   (CFS)   (MIN.)  (INCH/HOUR)  (ACRE)
1        36.95    12.63   5.072       15.00
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 168.00 = 1695.36 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
STREAM   RUNOFF   Tc     INTENSITY   AREA
NUMBER   (CFS)   (MIN.)  (INCH/HOUR)  (ACRE)
1        8.73     12.10   5.214       3.00
LONGEST FLOWPATH FROM NODE 163.00 TO NODE 168.00 = 1090.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM   RUNOFF   Tc     INTENSITY
NUMBER   (CFS)   (MIN.)  (INCH/HOUR)
1        44.14    12.10   5.214
2        45.44    12.63   5.072

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 45.44  Tc (MIN.) = 12.63
TOTAL AREA (ACRES) = 18.0
FLOW PROCESS FROM NODE 168.00 TO NODE 182.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) = 863.00 DOWNSTREAM(FEET) = 852.00
FLOW LENGTH(FEET) = 748.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.95
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 45.44 PIPE TRAVEL TIME(MIN.) = 1.14 Tc(MIN.) = 13.77
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 182.00 = 2443.36 FEET.

FLOW PROCESS FROM NODE 182.00 TO NODE 182.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<
============================================================================
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 13.77 RAINFALL INTENSITY(INCH/HR) = 4.80
TOTAL STREAM AREA(ACRES) = 18.00 PEAK FLOW RATE(CFS) AT CONFLUENCE = 45.44

FLOW PROCESS FROM NODE 183.00 TO NODE 184.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
============================================================================
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(FEET) = 50.00
UPSTREAM ELEVATION(FeET) = 897.30 DOWNSTREAM ELEVATION(FeET) = 896.80
ELEVATION DIFFERENCE(FeET) = 0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.128
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.337
SUBAREA RUNOFF(CFS) = 0.40 TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.40

FLOW PROCESS FROM NODE 184.00 TO NODE 185.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FeET) = 896.80 DOWNSTREAM ELEVATION(FeET) = 858.00
STREET LENGTH(FeET) = 687.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FeET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FeET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.26**
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.40
HALFSTREET FLOOD WIDTH(FEET) = 13.48
AVERAGE FLOW VELOCITY(FT/SEC.) = 6.34
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.51
STREET FLOW TRAVEL TIME(MIN.) = 1.81  Tc(MIN.) = 8.93
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.342
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = 0.5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA(ACRES) = 6.90  SUBAREA RUNOFF(CFS) = 23.63
TOTAL AREA(ACRES) = 7.0  PEAK FLOW RATE(CFS) = 23.97

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FT) = 0.40  HALFSTREET FLOOD WIDTH(FT) = 17.62
FLOW VELOCITY(FT/SEC.) = 7.44  DEPTH*VELOCITY(FT*ft/SEC.) = 3.56
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 687.0 FT WITH ELEVATION-DROP = 38.8 FT, IS 31.7 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 185.00
LONGEST FLOWPATH FROM NODE 183.00 TO NODE 185.00 = 737.00 FEET.

FLOW PROCESS FROM NODE 185.00 TO NODE 182.00 IS CODE = 31
------------------------------------------------------------------------------------------------------------------------
>>>><<<<<<COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>><<<<<<USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<
------------------------------------------------------------------------------------------------------------------------
ELEVATION DATA: UPSTREAM(FT) = 852.50  DOWNSTREAM(FT) = 852.00
FLOW LENGTH(FT) = 36.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.6 INCHES
PIPE FLOW VELOCITY(FT/SEC.) = 9.16
ESTIMATED PIPE DIAMETER(INCH) = 24.00  NUMBER OF PIPES = 1
PIPE FLOW(CFS) = 23.97
PIPE TRAVEL TIME(MIN.) = 0.07  Tc(MIN.) = 9.00
LONGEST FLOWPATH FROM NODE 183.00 TO NODE 182.00 = 773.00 FEET.

FLOW PROCESS FROM NODE 182.00 TO NODE 182.00 IS CODE = 1
------------------------------------------------------------------------------------------------------------------------
>>>><<<<<<DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<
------------------------------------------------------------------------------------------------------------------------
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.00
RAINFALL INTENSITY(INCH/HR) = 6.31
TOTAL STREAM AREA(ACRES) = 7.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 23.97

******************************************************************************
FLOW PROCESS FROM NODE 186.00 TO NODE 187.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS <<<

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(FEET) = 50.00
UPSTREAM ELEVATION(Feet) = 870.00
DOWNSTREAM ELEVATION(Feet) = 869.50
ELEVATION DIFFERENCE(Feet) = 0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.128
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.337
SUBAREA RUNOFF(CFS) = 0.40
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.40

FLOW PROCESS FROM NODE 187.00 TO NODE 188.00 IS CODE = 62

>>> COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA <<<

UPSTREAM ELEVATION(Feet) = 869.50 DOWNSTREAM ELEVATION(Feet) = 858.00
STREET LENGTH(Feet) = 750.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(Feet) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.34
HALFSTREET FLOOD WIDTH(Feet) = 10.51
AVERAGE FLOW VELOCITY(Feet/SEC.) = 2.86
PRODUCT OF DEPTH*VELOCITY(FT*FT/SEC.) = 0.96
STREET FLOW TRAVEL TIME(MIN.) = 4.37 Tc(MIN.) = 11.50
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.389
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA(ACRES) = 2.10 SUBAREA RUNOFF(CFS) = 6.11
TOTAL AREA(ACRES) = 2.2 PEAK FLOW RATE(CFS) = 6.40

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(Feet) = 0.40 HALFSTREET FLOOD WIDTH(Feet) = 13.48
FLOW VELOCITY(Feet/SEC.) = 3.31 DEPTH*VELOCITY(FT*FT/SEC.) = 1.31
LONGEST FLOWPATH FROM NODE 186.00 TO NODE 188.00 = 800.00 FEET.

FLOW PROCESS FROM NODE 188.00 TO NODE 182.00 IS CODE = 31
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM (FEET) = 852.50  DOWNSTREAM (FEET) = 852.00
FLOW LENGTH (FEET) = 36.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 6.79
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OF PIPE = 1
PIPE-FLOW (CFS) = 6.40
PIPE TRAVEL TIME (MIN.) = 0.09  Tc (MIN.) = 11.59
LONGEST FLOWPATH FROM NODE 186.00 TO NODE 182.00 = 836.00 FEET.

FLOW PROCESS FROM NODE 182.00 TO NODE 182.00 IS CODE = 1

>>>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION (MIN.) = 11.59
RAINFALL INTENSITY (INCH/HR) = 5.36
TOTAL STREAM AREA (ACRES) = 2.20
PEAK FLOW RATE (CFS) AT CONFLUENCE = 6.40

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 45.44 13.77 4.797 18.00
2 23.97 9.00 6.312 7.00
3 6.40 11.59 5.363 2.20

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 58.64 9.00 6.312
2 65.00 11.59 5.363
3 69.39 13.77 4.797

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 69.39  Tc (MIN.) = 13.77
TOTAL AREA (ACRES) = 27.2
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 182.00 = 2443.36 FEET.

FLOW PROCESS FROM NODE 182.00 TO NODE 189.00 IS CODE = 31

>>>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM (FEET) = 852.00  DOWNSTREAM (FEET) = 848.50
FLOW LENGTH (FEET) = 46.00  MANNING'S N = 0.013

86
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 22.91
ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) =  69.39
PIPE TRAVEL TIME (MIN.) =  0.03 Tc (MIN.) = 13.80
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 189.00 = 2489.36 FEET.

******************************************************************************
FLOW PROCESS FROM NODE 189.00 TO NODE 189.00 IS CODE = 1
----------------------------------------------------------------------------

<<<<<<DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<
============================================================================
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) =  13.80
RAINFALL INTENSITY(INCH/HR) =  4.79
TOTAL STREAM AREA(ACRES) =  27.20
PEAK FLOW RATE(CFS) AT CONFLUENCE =  69.39

******************************************************************************
FLOW PROCESS FROM NODE 190.00 TO NODE 191.00 IS CODE = 21
----------------------------------------------------------------------------

<<<<<<RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
============================================================================
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(FEET) =  50.00
UPSTREAM ELEVATION(FEET) = 897.30
DOWNSTREAM ELEVATION(FEET) = 897.00
ELEVATION DIFFERENCE(FEET) = 0.30
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 8.451
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.573
SUBAREA RUNOFF(CFS) = 0.35
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.35

******************************************************************************
FLOW PROCESS FROM NODE 191.00 TO NODE 192.00 IS CODE = 62
----------------------------------------------------------------------------

<<<<<<COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>(STREET TABLE SECTION # 1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) = 897.00 DOWNSTREAM ELEVATION(FEET) = 854.00
STREET LENGTH(FEET) = 656.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.02
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.24
HALF STREET FLOOD WIDTH (FEET) = 5.78
AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.46
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 1.08
STREET FLOW TRAVEL TIME (MIN.) = 2.45  Tc (MIN.) = 10.90
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.578
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA (ACRES) = 1.10  SUBAREA RUNOFF (CFS) = 3.31
TOTAL AREA (ACRES) = 1.2  PEAK FLOW RATE (CFS) = 3.61

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.28  HALF STREET FLOOD WIDTH (FEET) = 7.71
FLOW VELOCITY (FEET/SEC.) = 5.07  DEPTH*VELOCITY (FT*FT/SEC.) = 1.42
LONGEST FLOWPATH FROM NODE 190.00 TO NODE 192.00 = 706.00 FEET.

FLOW PROCESS FROM NODE 192.00 TO NODE 189.00 IS CODE = 31

>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
ELEVATION DATA: UPSTREAM (FEET) = 849.00  DOWNSTREAM (FEET) = 848.50
FLOW LENGTH (FEET) = 42.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.1 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 5.53
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 3.61
PIPE TRAVEL TIME (MIN.) = 0.13  Tc (MIN.) = 11.03
LONGEST FLOWPATH FROM NODE 190.00 TO NODE 189.00 = 748.00 FEET.

FLOW PROCESS FROM NODE 189.00 TO NODE 189.00 IS CODE = 1

>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 11.03
RAINFALL INTENSITY (INCH/HR) = 5.54
TOTAL STREAM AREA (ACRES) = 1.20
PEAK FLOW RATE (CFS) AT CONFLUENCE = 3.61

** CONFLUENCE DATA **
<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>69.39</td>
<td>13.80</td>
<td>4.790</td>
<td>27.20</td>
</tr>
<tr>
<td>2</td>
<td>3.61</td>
<td>11.03</td>
<td>5.537</td>
<td>1.20</td>
</tr>
</tbody>
</table>

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

** PEAK FLOW RATE TABLE **
<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>63.65</td>
<td>11.03</td>
<td>5.537</td>
</tr>
<tr>
<td>2</td>
<td>72.52</td>
<td>13.80</td>
<td>4.790</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 72.52  
Tc (MIN.) = 13.80  
TOTAL AREA (ACRES) = 28.4  
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 189.00 = 2489.36 FEET.

ELEVATION DATA: UPSTREAM (FEET) = 848.50  
DOWNSTREAM (FEET) = 820.30  
FLOW LENGTH (FEET) = 464.00  
MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.5 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 21.48  
ESTIMATED PIPE DIAMETER (INCH) = 30.00  
NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 72.52  
PIPE TRAVEL TIME (MIN.) = 0.36  
Tc (MIN.) = 14.16  
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 159.00 = 2953.36 FEET.

** MAIN STREAM CONFLUENCE DATA **
<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>72.52</td>
<td>14.16</td>
<td>4.711</td>
<td>28.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>106.52</td>
<td>13.28</td>
<td>4.912</td>
<td>48.8</td>
</tr>
</tbody>
</table>

** MEMORY BANK # 1 CONFLUENCE DATA **
<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>174.50</td>
<td>13.28</td>
<td>4.912</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>174.69</td>
<td>14.16</td>
<td>4.711</td>
<td></td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 174.69  
Tc (MIN.) = 14.16  
TOTAL AREA (ACRES) = 77.2  
FLOW PROCESS FROM NODE 159.00 TO NODE 159.00 IS CODE = 11

** PEAK FLOW RATE TABLE **
<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>174.50</td>
<td>13.28</td>
<td>4.912</td>
</tr>
<tr>
<td>2</td>
<td>174.69</td>
<td>14.16</td>
<td>4.711</td>
</tr>
</tbody>
</table>

FLOW PROCESS FROM NODE 159.00 TO NODE 159.00 IS CODE = 11

FLOW PROCESS FROM NODE 159.00 TO NODE 159.00 IS CODE = 11

FLOW PROCESS FROM NODE 159.00 TO NODE 159.00 IS CODE = 11

FLOW PROCESS FROM NODE 159.00 TO NODE 159.00 IS CODE = 11
** MAIN STREAM CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 174.69 14.16 4.711 77.20
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 159.00 = 2953.36 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 10.76 5.49 8.686 1.40
LONGEST FLOWPATH FROM NODE 160.00 TO NODE 159.00 = 1176.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 78.43 5.49 8.686
2 180.53 14.16 4.711

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 180.53 Tc(MIN.) = 14.16
TOTAL AREA(ACRES) = 78.6

FLOW PROCESS FROM NODE 159.00 TO NODE 159.00 IS CODE = 12

FLOW PROCESS FROM NODE 193.00 TO NODE 193.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 14.45
RAINFALL INTENSITY (INCH/HR) = 4.65
TOTAL STREAM AREA (ACRES) = 78.60
PEAK FLOW RATE (CFS) AT CONFLUENCE = 180.53

*****************************************************************************
FLOW PROCESS FROM NODE 194.00 TO NODE 195.00 IS CODE = 21
----------------------------------------------------------------------------

>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS <<
============================================================================
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 872.00
DOWNSTREAM ELEVATION (FEET) = 866.00
ELEVATION DIFFERENCE (FEET) = 6.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 1.359
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF (CFS) = 0.80
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.80
*****************************************************************************
FLOW PROCESS FROM NODE 195.00 TO NODE 196.00 IS CODE = 62
----------------------------------------------------------------------------

>> COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA <<
(STREET TABLE SECTION # 1 USED) <<
============================================================================
UPSTREAM ELEVATION (FEET) = 866.00 DOWNSTREAM ELEVATION (FEET) = 813.00
STREET LENGTH (FEET) = 805.00 CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200
** TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.21
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.27
HALFSTREET FLOOD WIDTH (FEET) = 7.31
AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.92
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 1.34
STREET FLOW TRAVEL TIME (MIN.) = 2.73 Tc (MIN.) = 4.09
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 98
AREA-AVERAGE RUNOFF COEFFICIENT = 0.870
SUBAREA AREA (ACRES) = 0.60  SUBAREA RUNOFF (CFS) = 4.81
TOTAL AREA (ACRES) = 0.7  PEAK FLOW RATE (CFS) = 5.62

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.31  HALF STREET FLOOD WIDTH (FEET) = 9.44
FLOW VELOCITY (FEET / SEC.) = 5.57  DEPTH * VELOCITY (FT * FT / SEC.) = 1.75
LONGEST FLOWPATH FROM NODE 194.00 TO NODE 196.00 = 855.00 FEET.

FLOW PROCESS FROM NODE 196.00 TO NODE 193.00 IS CODE = 31

FLOW PROCESS FROM NODE 193.00 TO NODE 193.00 IS CODE = 1

FLOW PROCESS FROM NODE 197.00 TO NODE 198.00 IS CODE = 21

FLOW PROCESS FROM NODE 198.00 TO NODE 199.00 IS CODE = 62
**>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<**
**>>>>>(STREET TABLE SECTION # 1 USED)<<<<<**
============================================================================
UPSTREAM ELEVATION (FEET) = 838.00  DOWNSTREAM ELEVATION (FEET) = 813.00  
STREET LENGTH (FEET) = 553.00  CURB HEIGHT (INCHES) = 6.0  
STREET HALFWIDTH (FEET) = 30.00  
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00  
INSIDE STREET CROSSFALL (DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020  
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1  
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200  

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.21**  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH (FEET) = 0.29  
HALFSTREET FLOOD WIDTH (FEET) = 7.97  
AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.26  
PRODUCT OF DEPTH* VELOCITY (FT*FT/SEC.) = 1.22  
STREET FLOW TRAVEL TIME (MIN.) = 2.17  
Tc (MIN.) = 3.52  
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 9.222  
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.  
STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = 0.8700  
SOIL CLASSIFICATION IS "C"  
S.C.S. CURVE NUMBER (AMC II) = 98  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.870  
SUBAREA AREA (ACRES) = 0.60  
SUBAREA RUNOFF (CFS) = 4.81  
TOTAL AREA (ACRES) = 0.7  
PEAK FLOW RATE (CFS) = 5.62  

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH (FEET) = 0.33  
HALFSTREET FLOOD WIDTH (FEET) = 10.20  
FLOW VELOCITY (FEET/SEC.) = 4.85  
DEPTH*VELOCITY (FT*FT/SEC.) = 1.60  
LONGEST FLOWPATH FROM NODE 197.00 TO NODE 199.00 = 603.00 FEET.  

FLOW PROCESS FROM NODE 199.00 TO NODE 193.00 IS CODE = 31  
============================================================================
**>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<**
**>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<**
============================================================================
ELEVATION DATA: UPSTREAM (FEET) = 808.00  DOWNSTREAM (FEET) = 807.00  
FLOW LENGTH (FEET) = 15.00  MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.7 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 11.65  
ESTIMATED PIPE DIAMETER (INCH) = 18.00  
NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 5.62  
PIPE TRAVEL TIME (MIN.) = 0.02  
Tc (MIN.) = 3.55  
LONGEST FLOWPATH FROM NODE 197.00 TO NODE 193.00 = 618.00 FEET.  

FLOW PROCESS FROM NODE 193.00 TO NODE 193.00 IS CODE = 1
DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE
AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION (MIN.) = 3.55
RAINFALL INTENSITY (INCH/HR) = 9.22
TOTAL STREAM AREA (ACRES) = 0.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 5.62

** CONFLUENCE DATA **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>180.53</td>
<td>14.45</td>
<td>4.650</td>
<td>78.60</td>
</tr>
<tr>
<td>2</td>
<td>5.62</td>
<td>4.12</td>
<td>9.222</td>
<td>0.70</td>
</tr>
<tr>
<td>3</td>
<td>5.62</td>
<td>3.55</td>
<td>9.222</td>
<td>0.70</td>
</tr>
</tbody>
</table>

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

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>54.75</td>
<td>3.55</td>
<td>9.222</td>
</tr>
<tr>
<td>2</td>
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<td>9.222</td>
</tr>
<tr>
<td>3</td>
<td>186.19</td>
<td>14.45</td>
<td>4.650</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 186.19  Tc (MIN.) = 14.45
TOTAL AREA (ACRES) = 80.0
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 193.00 = 3323.36 FEET.

FLOW PROCESS FROM NODE 193.00 TO NODE 1100.00 IS CODE = 31
FLOW LENGTH (FEET) = 1113.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 16.67
ESTIMATED PIPE DIAMETER (INCH) = 51.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 186.19
PIPE TRAVEL TIME (MIN.) = 1.11  Tc (MIN.) = 15.56
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 1100.00 = 4436.36 FEET.

FLOW PROCESS FROM NODE 1100.00 TO NODE 1101.00 IS CODE = 31
FLOW LENGTH (FEET) = 53.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 29.20
ESTIMATED PIPE DIAMETER (INCH) = 39.00    NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 186.19
PIPE TRAVEL TIME (MIN.) = 0.03    Tc (MIN.) = 15.60
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 1101.00 = 4489.36 FEET.

FLOW PROCESS FROM NODE 1101.00 TO NODE 1102.00 IS CODE = 51

ELEVATION DATA: UPSTREAM (FEET) = 784.00  DOWNSTREAM (FEET) = 782.20
CHANNEL LENGTH THRU SUBAREA (FEET) = 300.00  CHANNEL SLOPE = 0.0060
CHANNEL BASE (FEET) = 10.00  "Z" FACTOR = 30.000
MANNING'S FACTOR = 0.030  MAXIMUM DEPTH (FEET) = 2.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.151
LAWNs, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = 0.3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 74
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 187.94
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.05
AVERAGE FLOW DEPTH (FEET) = 1.28  TRAVEL TIME (MIN.) = 1.64
Tc (MIN.) = 17.24
SUBAREA AREA (ACRES) = 2.80  SUBAREA RUNOFF (CFS) = 3.49
AREA- AVERAGE RUNOFF COEFFICIENT = 0.481
TOTAL AREA (ACRES) = 82.8  PEAK FLOW RATE (CFS) = 186.19

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.27  FLOW VELOCITY (FEET/SEC.) = 3.05
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 1102.00 = 4789.36 FEET.

FLOW PROCESS FROM NODE 1102.00 TO NODE 1103.00 IS CODE = 31

ELEVATION DATA: UPSTREAM (FEET) = 777.00  DOWNSTREAM (FEET) = 762.00
FLOW LENGTH (FEET) = 74.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 42.47
ESTIMATED PIPE DIAMETER (INCH) = 33.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 186.19
PIPE TRAVEL TIME (MIN.) = 0.03  Tc (MIN.) = 17.27
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 1103.00 = 4863.36 FEET.

FLOW PROCESS FROM NODE 1103.00 TO NODE 1104.00 IS CODE = 51

ELEVATION DATA: UPSTREAM (FEET) = 762.00  DOWNSTREAM (FEET) = 730.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 156.00  CHANNEL SLOPE = 0.2051
CHANNEL BASE (FEET) = 10.00  "Z" FACTOR = 10.000
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH (FEET) = 2.00
CHANNEL FLOW THRU SUBAREA (CFS) = 186.19
FLOW VELOCITY (FEET/SEC.) = 8.75  FLOW DEPTH (FEET) = 1.04
TRAVEL TIME (MIN.) = 0.30  Tc (MIN.) = 17.56
LONGEST FLOWPATH FROM NODE  176.00 TO NODE  1104.00 = 5019.36 FEET.

FLOW PROCESS FROM NODE  1104.00 TO NODE  1104.00 IS CODE = 10

FLOW PROCESS FROM NODE  1106.00 TO NODE  1107.00 IS CODE = 21

FLOW PROCESS FROM NODE  1107.00 TO NODE  1108.00 IS CODE = 51

FLOW PROCESS FROM NODE  1108.00 TO NODE  1109.00 IS CODE = 31
USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)

ELEVATION DATA: UPSTREAM( FEET ) = 840.00 DOWNSTREAM( FEET ) = 836.00
FLOW LENGTH( FEET ) = 145.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.6 INCHES
PIPE-FLOW VELOCITY( FEET/SEC. ) = 14.99
ESTIMATED PIPE DIAMETER( INCH ) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS ) = 62.06
PIPE TRAVEL TIME( MIN. ) = 0.16 Tc( MIN. ) = 15.64
LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1109.00 = 2625.00 FEET.

FLOW PROCESS FROM NODE 1109.00 TO NODE 1110.00 IS CODE = 51

COMPUTE TRAPEZOIDAL CHANNEL FLOW

ELEVATION DATA: UPSTREAM( FEET ) = 836.00 DOWNSTREAM( FEET ) = 820.00
CHANNEL LENGTH THRU SUBAREA( FEET ) = 599.00 CHANNEL SLOPE = 0.0267
CHANNEL BASE( FEET ) = 24.00 "Z" FACTOR = 2.500
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH( FEET ) = 3.00
100 YEAR RAINFALL INTENSITY( INCH/HOUR ) = 3.935
CHAPARRAL( BROADLEAF ) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER ( AMC II ) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW( CFS ) = 65.18
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY( FEET/SEC. ) = 3.24
AVERAGE FLOW DEPTH( FEET ) = 0.78 TRAVEL TIME( MIN. ) = 3.08
Tc( MIN. ) = 18.72
SUBAREA AREA( ACRES ) = 5.30 SUBAREA RUNOFF( CFS ) = 6.26
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA( ACRES ) = 51.8 PEAK FLOW RATE( CFS ) = 62.06

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH( FEET ) = 0.75 FLOW VELOCITY( FEET/SEC. ) = 3.19
LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1110.00 = 3224.00 FEET.

FLOW PROCESS FROM NODE 1110.00 TO NODE 1112.00 IS CODE = 51

COMPUTE TRAPEZOIDAL CHANNEL FLOW

ELEVATION DATA: UPSTREAM( FEET ) = 820.00 DOWNSTREAM( FEET ) = 810.00
FLOW LENGTH( FEET ) = 120.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.2 INCHES
PIPE-FLOW VELOCITY( FEET/SEC. ) = 23.29
ESTIMATED PIPE DIAMETER( INCH ) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW( CFS ) = 62.06
PIPE TRAVEL TIME( MIN. ) = 0.09 Tc( MIN. ) = 18.81
LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1112.00 = 3344.00 FEET.
ELEVATION DATA: UPSTREAM(Feet) = 810.00 DOWNSTREAM(Feet) = 787.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 381.00 CHANNEL SLOPE = 0.0604
CHANNEL BASE(Feet) = 24.00 "Z" FACTOR = 2.500
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH(Feet) = 3.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.731
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 63.68
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/SEC.) = 4.16
AVERAGE FLOW DEPTH(Feet) = 0.60 TRAVEL TIME(MIN.) = 1.53
Tc(MIN.) = 20.33
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 3.25
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 54.7 PEAK FLOW RATE(CFS) = 62.06

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.59 FLOW VELOCITY(Feet/SEC.) = 4.11
LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1112.00 = 3725.00 FEET.

FLOW PROCESS FROM NODE 1112.00 TO NODE 1112.00 IS CODE = 1

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 20.33
RAINFALL INTENSITY(INCH/HR) = 3.73
TOTAL STREAM AREA(ACRES) = 54.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 62.06

FLOW PROCESS FROM NODE 1113.00 TO NODE 1114.00 IS CODE = 21

CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
INITIAL SUBAREA FLOW-LENGTH(Feet) = 50.00
UPSTREAM ELEVATION(Feet) = 940.00
DOWNSTREAM ELEVATION(Feet) = 939.00
ELEVATION DIFFERENCE(Feet) = 1.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 8.082
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.765
SUBAREA RUNOFF(CFS) = 0.20
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.20

FLOW PROCESS FROM NODE 1114.00 TO NODE 1115.00 IS CODE = 51

COMPUTE TRAPEZOIDAL CHANNEL FLOW
TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)

ELEVATION DATA: UPSTREAM(Feet) = 939.00 DOWNSTREAM(Feet) = 804.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 1333.00  CHANNEL SLOPE = 0.1013
CHANNEL BASE (FEET) = 20.00  "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH (FEET) = 3.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.068
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = 0.300
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 7.59
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 2.29
AVERAGE FLOW DEPTH (FEET) = 0.16  TRAVEL TIME (MIN.) = 9.70
Tc (MIN.) = 17.79
SUBAREA AREA (ACRES) = 11.40  SUBAREA RUNOFF (CFS) = 13.91
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA (ACRES) = 11.5  PEAK FLOW RATE (CFS) = 14.03
END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.23  FLOW VELOCITY (FEET/SEC.) = 2.93
LONGEST FLOWPATH FROM NODE 1113.00 TO NODE 1115.00 = 1383.00 FEET.

FLOW PROCESS FROM NODE 1115.00 TO NODE 1112.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<<
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<<
============================================================================
ELEVATION DATA: UPSTREAM (FEET) = 804.00  DOWNSTREAM (FEET) = 787.00
FLOW LENGTH (FEET) = 143.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 18.46
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 14.03
PIPE TRAVEL TIME (MIN.) = 0.13  Tc (MIN.) = 17.91
LONGEST FLOWPATH FROM NODE 1113.00 TO NODE 1112.00 = 1526.00 FEET.

FLOW PROCESS FROM NODE 1112.00 TO NODE 1112.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<<
>>> AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES <<<<
============================================================================
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 17.91
RAINFALL INTENSITY (INCH/HR) = 4.05
TOTAL STREAM AREA (ACRES) = 11.50
PEAK FLOW RATE (CFS) AT CONFLUENCE = 14.03

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 62.06 20.33 3.731 54.70
2 14.03 17.91 4.049 11.50

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.
** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>68.71</td>
<td>17.91</td>
<td>4.049</td>
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<tr>
<td>2</td>
<td>74.99</td>
<td>20.33</td>
<td>3.731</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 74.99  Tc (MIN.) = 20.33

TOTAL AREA (ACRES) = 66.2
LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1112.00 = 3725.00 FEET.

FLOW PROCESS FROM NODE 1112.00 TO NODE 1116.00 IS CODE = 51

FLOW PROCESS FROM NODE 1116.00 TO NODE 1116.00 IS CODE = 10

FLOW PROCESS FROM NODE 1117.00 TO NODE 1118.00 IS CODE = 21

CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 938.00
DOWNSTREAM ELEVATION (FEET) = 934.00
ELEVATION DIFFERENCE (FEET) = 4.00
SUBAREA OVERTLAND TIME OF FLOW (MIN.) = 5.092
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 9.114
SUBAREA RUNOFF (CFS) = 0.27
TOTAL AREA (ACRES) = 0.10  TOTAL RUNOFF (CFS) = 0.27

*****************************************************************************
FLOW PROCESS FROM NODE 1118.00 TO NODE 1119.00 IS CODE = 51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM (FEET) = 934.00  DOWNSTREAM (FEET) = 804.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 900.00  CHANNEL SLOPE = 0.1444
CHANNEL BASE (FEET) = 18.00  "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH (FEET) = 2.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.632
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 7.56
AVERAGE FLOW DEPTH (FEET) = 0.16  TRAVEL TIME (MIN.) = 5.65
Tc (MIN.) = 10.74
SUBAREA AREA (ACRES) = 8.20  SUBAREA RUNOFF (CFS) = 13.86
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA (ACRES) = 8.3  PEAK FLOW RATE (CFS) = 14.02
END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.22  FLOW VELOCITY (FEET/SEC.) = 3.39
LONGEST FLOWPATH FROM NODE 1117.00 TO NODE 1119.00 = 950.00 FEET.
*****************************************************************************
FLOW PROCESS FROM NODE 1119.00 TO NODE 1120.00 IS CODE = 31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM (FEET) = 804.00  DOWNSTREAM (FEET) = 796.00
FLOW LENGTH (FEET) = 82.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 17.16
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 14.02
PIPE TRAVEL TIME (MIN.) = 0.08  Tc (MIN.) = 10.82
LONGEST FLOWPATH FROM NODE 1117.00 TO NODE 1120.00 = 1032.00 FEET.
*****************************************************************************
FLOW PROCESS FROM NODE 1120.00 TO NODE 1116.00 IS CODE = 51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM (FEET) = 796.00  DOWNSTREAM (FEET) = 766.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 385.00  CHANNEL SLOPE = 0.0779
CHANNEL BASE (FEET) = 25.00  "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH (FEET) = 2.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.902
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.28
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.57
AVERAGE FLOW DEPTH(Feet) = 0.23 TRAVEL TIME(MIN.) = 2.50
Tc(MIN.) = 13.32
SUBAREA AREA(ACRES) = 1.70 SUBAREA RUNOFF(CFS) = 2.50
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 10.0 PEAK FLOW RATE(CFS) = 14.71

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.23 FLOW VELOCITY(Feet/Sec.) = 2.56
LONGEST FLOWPATH FROM NODE 1117.00 TO NODE 1116.00 = 1417.00 FEET.

*****************************************************************************
FLOW PROCESS FROM NODE 1116.00 TO NODE 1116.00 IS CODE = 10
----------------------------------------------------------------------------
>>><<MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================
*****************************************************************************
FLOW PROCESS FROM NODE 1121.00 TO NODE 1122.00 IS CODE = 21
----------------------------------------------------------------------------
>>><<RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
============================================================================
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
INITIAL SUBAREA FLOW-LENGTH(Feet) = 50.00
UPSTREAM ELEVATION(Feet) = 916.00
DOWNSTREAM ELEVATION(Feet) = 914.00
ELEVATION DIFFERENCE(Feet) = 2.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.934
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.257
SUBAREA RUNOFF(CFS) = 2.97
TOTAL AREA(ACRES) = 1.00 TOTAL RUNOFF(CFS) = 2.97
*****************************************************************************
FLOW PROCESS FROM NODE 1122.00 TO NODE 1123.00 IS CODE = 62
----------------------------------------------------------------------------
>>><<COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>><<STREET TABLE SECTION # 1 USED<<<<
============================================================================
UPSTREAM ELEVATION(Feet) = 914.00 DOWNSTREAM ELEVATION(Feet) = 825.00
STREET LENGTH(Feet) = 1736.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(Feet) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200
**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.98
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.45
HALFSTREET FLOOD WIDTH (FEET) = 16.05
AVERAGE FLOW VELOCITY (FEET/SEC.) = 6.67
PRODUCT OF DEPTH*VELOCITY (FT*FT/SEC.) = 2.98
STREET FLOW TRAVEL TIME (MIN.) = 4.34  Tc(MIN.) = 10.27
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.796
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.523
SUBAREA AREA (ACRES) = 9.60  SUBAREA RUNOFF (CFS) = 30.05
TOTAL AREA (ACRES) = 10.6  PEAK FLOW RATE (CFS) = 32.13
END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.53  HALFSTREET FLOOD WIDTH (FEET) = 21.55
FLOW VELOCITY (FEET/SEC.) = 7.68  DEPTH*VELOCITY (FT*FT/SEC.) = 4.06
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 1736.0 FT WITH ELEVATION-DROP = 89.0 FT, IS 43.2 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 1123.00
LONGEST FLOWPATH FROM NODE 1121.00 TO NODE 1123.00 = 1786.00 FEET.

FLOW PROCESS FROM NODE 1123.00 TO NODE 1124.00 IS CODE = 31

>>> > > > C O M P U T E  P I P E - F L O W  T R A V E L  T I M E  T H R U  S U B A R E A <<<<<<

ELEVATION DATA: UPSTREAM (FEET) = 820.00  DOWNSTREAM (FEET) = 819.60
FLOW LENGTH (FEET) = 35.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 9.35
ESTIMATED PIPE DIAMETER (INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 32.13
PIPE TRAVEL TIME (MIN.) = 0.06  Tc(MIN.) = 10.33
LONGEST FLOWPATH FROM NODE 1121.00 TO NODE 1124.00 = 1821.00 FEET.

FLOW PROCESS FROM NODE 1124.00 TO NODE 1124.00 IS CODE = 1

>>> > > > D E S I G N A T E  I N D E P E N D E N T  S T R E A M  F O R  C O N F L U E N C E <<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 10.33
RAINFALL INTENSITY (INCH/HR) = 5.77
TOTAL STREAM AREA (ACRES) = 10.60
PEAK FLOW RATE (CFS) AT CONFLUENCE = 32.13

FLOW PROCESS FROM NODE 1125.00 TO NODE 1126.00 IS CODE = 21

>>> > > > R A T I O N A L  M E T H O D  I N I T I A L  S U B A R E A  A N A L Y S I S <<<<<<

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 930.30
DOWNSTREAM ELEVATION (FEET) = 929.20
ELEVATION DIFFERENCE (FEET) = 1.10
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 5.480
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 8.692
SUBAREA RUNOFF (CFS) = 0.47
TOTAL AREA (ACRES) = 0.10  TOTAL RUNOFF (CFS) = 0.47

FLOW PROCESS FROM NODE 1126.00 TO NODE 1124.00 IS CODE = 62

>>>/COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>/STREET TABLE SECTION # 1 USED<<<<

UPSTREAM ELEVATION (FEET) = 929.20  DOWNSTREAM ELEVATION (FEET) = 825.00
STREET LENGTH (FEET) = 1940.00  CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 17.52
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.44
HALFSTREET FLOOD WIDTH (FEET) = 15.74
AVERAGE FLOW VELOCITY (FEET/SEC.) = 6.75
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 2.98
STREET FLOW TRAVEL TIME (MIN.) = 4.07  Tc (MIN.) = 10.27
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.796
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA (ACRES) = 10.60  SUBAREA RUNOFF (CFS) = 33.18
TOTAL AREA (ACRES) = 10.7  PEAK FLOW RATE (CFS) = 33.49

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.53  HALFSTREET FLOOD WIDTH (FEET) = 21.86
FLOW VELOCITY (FEET/SEC.) = 7.87  DEPTH*VELOCITY (FT*FT/SEC.) = 4.19
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
AND L = 1940.0 FT WITH ELEVATION-DROP = 104.2 FT, IS 48.2 CFS,
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 1124.00
LONGEST FLOWPATH FROM NODE 1125.00 TO NODE 1124.00 = 1990.00 FEET.

FLOW PROCESS FROM NODE 1124.00 TO NODE 1124.00 IS CODE = 1

>>>/DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>/AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

104
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 10.27
RAINFALL INTENSITY (INCH/HR) = 5.80
TOTAL STREAM AREA (ACRES) = 10.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 33.49

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 32.13 10.33 5.773 10.60
2 33.49 10.27 5.796 10.70

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 65.43 10.27 5.796
2 65.49 10.33 5.773

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 65.49 Tc (MIN.) = 10.33
TOTAL AREA (ACRES) = 21.3
LONGEST FLOWPATH FROM NODE 1125.00 TO NODE 1124.00 = 1990.00 FEET.

FLOW PROCESS FROM NODE 1124.00 TO NODE 1127.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
ELEVATION DATA: UPSTREAM (FEET) = 819.60 DOWNSTREAM (FEET) = 790.00
FLOW LENGTH (FEET) = 80.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.1 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 41.33
ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 65.49
PIPE TRAVEL TIME (MIN.) = 0.03 Tc (MIN.) = 10.37
LONGEST FLOWPATH FROM NODE 1125.00 TO NODE 1127.00 = 2070.00 FEET.

FLOW PROCESS FROM NODE 1127.00 TO NODE 1116.00 IS CODE = 51

>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW
>>> TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)
ELEVATION DATA: UPSTREAM (FEET) = 790.00 DOWNSTREAM (FEET) = 766.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 354.00 CHANNEL SLOPE = 0.0678
CHANNEL BASE (FEET) = 10.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH (FEET) = 3.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.416
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 66.87
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.66
AVERAGE FLOW DEPTH (FEET) = 0.99 TRAVEL TIME (MIN.) = 1.04
Tc (MIN.) = 11.41
SUBAREA AREA (ACRES) = 1.70 SUBAREA RUNOFF (CFS) = 2.76
AREA-AVERAGE RUNOFF COEFFICIENT = 0.514
TOTAL AREA (ACRES) = 23.0 PEAK FLOW RATE (CFS) = 65.49

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.97 FLOW VELOCITY (FEET/SEC.) = 5.63
LONGEST FLOWPATH FROM NODE 1125.00 TO NODE 1116.00 = 2424.00 FEET.

******************************************************************************
FLOW PROCESS FROM NODE 1116.00 TO NODE 1116.00 IS CODE = 11
----------------------------------------------------------------------------
>>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<<
============================================================================

** MAIN STREAM CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 65.49 11.41 5.416 23.00
LONGEST FLOWPATH FROM NODE 1125.00 TO NODE 1116.00 = 2424.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 74.99 23.90 3.362 70.40
LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1116.00 = 4473.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 101.29 11.41 5.416
2 115.64 23.90 3.362

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 115.64 Tc (MIN.) = 23.90
TOTAL AREA (ACRES) = 93.4

******************************************************************************
FLOW PROCESS FROM NODE 1116.00 TO NODE 1116.00 IS CODE = 11
----------------------------------------------------------------------------
>>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<<
============================================================================

** MAIN STREAM CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 115.64 23.90 3.362 93.40
LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1116.00 = 4473.00 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 14.71 13.32 4.902 10.00
LONGEST FLOWPATH FROM NODE 1117.00 TO NODE 1116.00 = 1417.00 FEET.

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** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
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<tr>
<td>1</td>
<td>79.16</td>
<td>13.32</td>
<td>4.902</td>
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<tr>
<td>2</td>
<td>125.73</td>
<td>23.90</td>
<td>3.362</td>
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</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 125.73
Tc (MIN.) = 23.90

TOTAL AREA (ACRES) = 103.4

FLOW PROCESS FROM NODE 1116.00 TO NODE 1116.00 IS CODE = 12

FLOW PROCESS FROM NODE 1116.00 TO NODE 1116.00 IS CODE = 51

FLOW PROCESS FROM NODE 1116.00 TO NODE 1104.00 IS CODE = 21

ELEVATION DATA:
UPSTREAM (FEET) = 766.00
DOWNSTREAM (FEET) = 730.00

CHANNEL LENGTH THRU SUBAREA (FEET) = 684.00
CHANNEL SLOPE = 0.0526

MANNING'S FACTOR = 0.060
MAXIMUM DEPTH (FEET) = 4.00

100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 3.175

CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = 0.3000

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 71

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 129.49
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.15

AVERAGE FLOW DEPTH (FEET) = 0.94
TRAVEL TIME (MIN.) = 2.21

Tc (MIN.) = 26.11

SUBAREA AREA (ACRES) = 7.90
SUBAREA RUNOFF (CFS) = 7.53

AREA-AVERAGE RUNOFF COEFFICIENT = 0.344

TOTAL AREA (ACRES) = 111.3
PEAK FLOW RATE (CFS) = 125.73

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 0.92
FLOOR VELOCITY (FEET/SEC.) = 5.09

LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1104.00 = 5157.00 FEET.
RATIONAL METHOD INITIAL SUBAREA ANALYSIS

CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 892.00
DOWNSTREAM ELEVATION (FEET) = 886.00
ELEVATION DIFFERENCE (FEET) = 6.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 4.727
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF (CFS) = 0.28
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.28

FLOW PROCESS FROM NODE 1129.00 TO NODE 1130.00 IS CODE = 51

---COMPUTE TRAPEZOIDAL CHANNEL FLOW---
---TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)---

ELEVATION DATA: UPSTREAM (FEET) = 886.00 DOWNSTREAM (FEET) = 800.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 578.00 CHANNEL SLOPE = 0.1488
CHANNEL BASE (FEET) = 28.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH (FEET) = 2.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.738
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.76
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 1.69
AVERAGE FLOW DEPTH (FEET) = 0.08 TRAVEL TIME (MIN.) = 5.71
Tc (MIN.) = 10.43
SUBAREA AREA (ACRES) = 3.80 SUBAREA RUNOFF (CFS) = 6.54
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA (ACRES) = 3.9 PEAK FLOW RATE (CFS) = 6.71

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.11 FLOW VELOCITY (FEET/SEC.) = 2.17
LONGEST FLOWPATH FROM NODE 1128.00 TO NODE 1130.00 = 628.00 FEET.

FLOW PROCESS FROM NODE 1130.00 TO NODE 1131.00 IS CODE = 31

---COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA---
---USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)---

ELEVATION DATA: UPSTREAM (FEET) = 800.00 DOWNSTREAM (FEET) = 780.00
FLOW LENGTH (FEET) = 158.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.3 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 15.42
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 6.71
PIPE TRAVEL TIME (MIN.) = 0.17 Tc (MIN.) = 10.61
LONGEST FLOWPATH FROM NODE 1128.00 TO NODE 1131.00 = 786.00 FEET.
FLOW PROCESS FROM NODE 1131.00 TO NODE 1104.00 IS CODE = 51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 780.00 DOWNSTREAM(FEET) = 730.00
CHANNEL LENGTH THRU SUBAREA( FEET) = 580.00 CHANNEL SLOPE = 0.0862
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH( FEET) = 4.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.544

CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.32
TRAVEL THRU SUBAREA BASED ON VELOCITY( FEET/SEC.) = 2.21
AVERAGE FLOW DEPTH( FEET) = 0.17 TRAVEL TIME(MIN.) = 4.37
Tc(MIN.) = 14.98
SUBAREA AREA(ACRES) = 3.80 SUBAREA RUNOFF(CFS) = 5.18
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 7.7 PEAK FLOW RATE(CFS) = 10.50

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH( FEET) = 0.19 FLOW VELOCITY( FEET/SEC.) = 2.31
LONGEST FLOWPATH FROM NODE 1128.00 TO NODE 1104.00 = 1366.00 FEET.

FLOW PROCESS FROM NODE 1104.00 TO NODE 1104.00 IS CODE = 11

>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 10.50 14.98 4.544 7.70
LONGEST FLOWPATH FROM NODE 1128.00 TO NODE 1104.00 = 1366.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 186.19 17.56 4.101 82.80
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 1104.00 = 5019.36 FEET.

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 169.30 14.98 4.544
2 195.67 17.56 4.101

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 195.67 Tc(MIN.) = 17.56
TOTAL AREA(ACRES) = 90.5

FLOW PROCESS FROM NODE 1104.00 TO NODE 1104.00 IS CODE = 11
** MAIN STREAM CONFLUENCE DATA **

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<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
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<tr>
<td>1</td>
<td>195.67</td>
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<td>90.50</td>
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LONGEST FLOWPATH FROM NODE 176.00 TO NODE 1104.00 = 5019.36 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

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<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
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<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
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<td>111.30</td>
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LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1104.00 = 5157.00 FEET.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>280.24</td>
<td>17.56</td>
<td>4.101</td>
</tr>
<tr>
<td>2</td>
<td>277.24</td>
<td>26.11</td>
<td>3.175</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 280.24  Tc (MIN.) = 17.56  TOTAL AREA (ACRES) = 201.8

FLOW PROCESS FROM NODE 1104.00 TO NODE 1104.00 IS CODE = 12

>>> CLEAR MEMORY BANK # 1 <<<=

FLOW PROCESS FROM NODE 1104.00 TO NODE 1104.00 IS CODE = 12

>>> CLEAR MEMORY BANK # 2 <<<=

FLOW PROCESS FROM NODE 1104.00 TO NODE 1132.00 IS CODE = 51

>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW <<<=

ELEVATION DATA: UPSTREAM (FEET) = 730.00  DOWNSTREAM (FEET) = 636.00

CHANNEL LENGTH THRU SUBAREA (FEET) = 1083.00  CHANNEL SLOPE = 0.0868

CHANNEL BASE (FEET) = 15.00  "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.060  MAXIMUM DEPTH (FEET) = 5.00

100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 3.827

CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 71

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 284.71

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 9.08

AVERAGE FLOW DEPTH (FEET) = 1.70  TRAVEL TIME (MIN.) = 1.99

Tc (MIN.) = 19.55

SUBAREA AREA (ACRES) = 7.80  SUBAREA RUNOFF (CFS) = 8.95
AREA-AVERAGE RUNOFF COEFFICIENT = 0.395
TOTAL AREA(ACRES) = 209.6 PEAK FLOW RATE(CFS) = 316.83

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.81 FLOW VELOCITY(FEET/SEC.) = 9.39
LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1132.00 = 6240.00 FEET.

FLOW PROCESS FROM NODE 1132.00 TO NODE 1132.00 IS CODE = 10

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 IS CODE = 21

FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 IS CODE = 62

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH(FEET) = 50.00
UPSTREAM ELEVATION(FEET) = 901.30
DOWNSTREAM ELEVATION(FEET) = 900.80
ELEVATION DIFFERENCE(Feet) = 0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.128
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.337
SUBAREA RUNOFF(CFS) = 0.40
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.40

FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 IS CODE = 62

STREET LENGTH(Feet) = 315.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(Feet) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.06
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(Feet) = 0.30
HALFSTREET FLOOD WIDTH(Feet) = 8.71
AVERAGE FLOW VELOCITY(Feet/SEC.) = 2.36
PRODUCT OF DEPTH&VELOCITY(FT*ft/SEC.) = 0.71
STREET FLOW TRAVEL TIME(MIN.) = 2.23 Tc(MIN.) = 9.35
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.156
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540
SUBAREA AREA (ACRES) = 1.00  SUBAREA RUNOFF (CFS) = 3.32
TOTAL AREA (ACRES) = 1.1  PEAK FLOW RATE (CFS) = 3.66

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.35  HALF STREET FLOOD WIDTH (FEET) = 11.13
FLOW VELOCITY (FEET/SEC.) = 2.69  DEPTH*VELOCITY (FT*FT/SEC.) = 0.94
LONGEST FLOWPATH FROM NODE 201.00 TO NODE 203.00 = 365.00 FEET.

FLOW PROCESS FROM NODE 203.00 TO NODE 204.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<
ELEVATION DATA: UPSTREAM (FEET) = 891.00  DOWNSTREAM (FEET) = 890.70
FLOW LENGTH (FEET) = 24.00  MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.00 INCH PIPE IS 7.1 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 5.65
ESTIMATED PIPE DIAMETER (INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 3.66
PIPE TRAVEL TIME (MIN.) = 0.07  Tc (MIN.) = 9.43
LONGEST FLOWPATH FROM NODE 201.00 TO NODE 204.00 = 389.00 FEET.

FLOW PROCESS FROM NODE 204.00 TO NODE 204.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 9.43
RAINFALL INTENSITY (INCH/HR) = 6.13
TOTAL STREAM AREA (ACRES) = 1.10
PEAK FLOW RATE (CFS) AT CONFLUENCE = 3.66

FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 925.00
DOWNSTREAM ELEVATION (FEET) = 924.50
ELEVATION DIFFERENCE (FEET) = 0.50
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 7.128
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.337
SUBAREA RUNOFF (CFS) = 0.40
TOTAL AREA (ACRES) = 0.10  TOTAL RUNOFF (CFS) = 0.40

112
FLOW PROCESS FROM NODE 206.00 TO NODE 204.00 IS CODE = 62

COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA
(STREET TABLE SECTION # 1 USED)

UPSTREAM ELEVATION (FEET) = 924.50
DOWNSTREAM ELEVATION (FEET) = 896.00

STREET LENGTH (FEET) = 785.00
CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 6.68**

STREET FLOW DEPTH (FEET) = 0.36
HALFSTREET FLOOD WIDTH (FEET) = 11.52
AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.62
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 1.65
STREET FLOW TRAVEL TIME (MIN.) = 2.83
100 YEAR RAINFOLL INTENSITY (INCH/HOUR) = 5.912
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = 0.5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5400
SUBAREA AREA (ACRES) = 3.90
SUBAREA RUNOFF (CFS) = 12.45
TOTAL AREA (ACRES) = 4.0
PEAK FLOW RATE (CFS) = 12.77

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.43
HALFSTREET FLOOD WIDTH (FEET) = 14.96
FLOW VELOCITY (FEET/SEC.) = 5.42
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 2.31
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 204.00 = 835.00 FEET.

**CONFLUENCE DATA**

STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 3.66 9.43 6.126 1.10
2 12.77 9.96 5.912 4.00

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 9.96
RAINFALL INTENSITY (INCH/HR) = 5.91
TOTAL STREAM AREA (ACRES) = 4.00
PEAK FLOW RATE (CFS) AT CONFLUENCE = 12.77
RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15.74</td>
<td>9.43</td>
<td>6.126</td>
</tr>
<tr>
<td>2</td>
<td>16.30</td>
<td>9.96</td>
<td>5.912</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 16.30
Tc (MIN.) = 9.96
TOTAL AREA (ACRES) = 5.1
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 204.00 = 835.00 FEET.

FLOW PROCESS FROM NODE 204.00 TO NODE 207.00 IS CODE = 31

FLOW LENGTH (FEET) = 205.00
MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.3 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 8.16
PIPE FLOW VELOCITY (CFS) = 16.30
PIPE TRAVEL TIME (MIN.) = 0.42
Tc (MIN.) = 10.38
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 207.00 = 1040.00 FEET.

FLOW PROCESS FROM NODE 207.00 TO NODE 207.00 IS CODE = 1

FLOW LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 901.00
DOWNSTREAM ELEVATION (FEET) = 900.00
ELEVATION DIFFERENCE (FEET) = 1.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 5.657
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 8.515
SUBAREA RUNOFF (CFS) = 0.46
TOTAL AREA (ACRES) = 0.10  TOTAL RUNOFF (CFS) = 0.46

*****************************************************************************
FLOW PROCESS FROM NODE  209.00 TO NODE  207.00 IS CODE =  62
*****************************************************************************

>>> COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA <<<
>>> (STREET TABLE SECTION # 1 USED) <<<
*****************************************************************************
UPSTREAM ELEVATION (FEET) = 900.00  DOWNSTREAM ELEVATION (FEET) = 892.00
STREET LENGTH (FEET) = 273.00  CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 1.65**
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.25
HALFSTREET FLOOD WIDTH (FEET) = 6.38
AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.15
PRODUCT OF DEPTH & VELOCITY (FT * FT/SEC.) = 0.80
STREET FLOW TRAVEL TIME (MIN.) = 1.45  Tc (MIN.) = 7.10
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.353
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = 0.5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5400
SUBAREA AREA (ACRES) = 0.60  SUBAREA RUNOFF (CFS) = 2.38
TOTAL AREA (ACRES) = 0.7  PEAK FLOW RATE (CFS) = 2.78

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.29  HALFSTREET FLOOD WIDTH (FEET) = 8.24
FLOW VELOCITY (FEET/SEC.) = 3.49  DEPTH * VELOCITY (FT * FT/SEC.) = 1.01
LONGEST FLOWPATH FROM NODE  208.00 TO NODE  207.00 = 323.00 FEET.

*****************************************************************************
FLOW PROCESS FROM NODE  207.00 TO NODE  207.00 IS CODE =  1
*****************************************************************************

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<
>>> AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES <<<
*****************************************************************************
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 7.10
RAINFALL INTENSITY (INCH/HR) = 7.35
TOTAL STREAM AREA (ACRES) = 0.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 2.78

** CONFLUENCE DATA **
STREAM NUMBER  RUNOFF (CFS)  Tc (MIN.)  INTENSITY (INCH/HOUR)  AREA (ACRE)
RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15.54</td>
<td>7.10</td>
<td>7.353</td>
</tr>
<tr>
<td>2</td>
<td>18.48</td>
<td>10.38</td>
<td>5.757</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 18.48  Tc (MIN.) = 10.38
TOTAL AREA (ACRES) = 5.8
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 207.00 = 1040.00 FEET.

FLOW PROCESS FROM NODE 207.00 TO NODE 210.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<
>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<

ELEVATION DATA: UPSTREAM (FEET) = 888.00  DOWNSTREAM (FEET) = 887.50
FLOW LENGTH (FEET) = 25.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.1 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 9.95
ESTIMATED PIPE DIAMETER (INCH) = 21.00  NUMBER OFPIPES = 1
PIPE-FLOW (CFS) = 18.48
PIPE TRAVEL TIME (MIN.) = 0.04  Tc (MIN.) = 10.42
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 210.00 = 1065.00 FEET.

FLOW PROCESS FROM NODE 210.00 TO NODE 210.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 10.42
RAINFALL INTENSITY (INCH/HR) = 5.74
TOTAL STREAM AREA (ACRES) = 5.80
PEAK FLOW RATE (CFS) AT CONFLUENCE = 18.48

FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS <<<

RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = 0.5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 917.20
DOWNSTREAM ELEVATION (FEET) = 916.50
ELEVATION DIFFERENCE (FEET) = 0.70
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 6.371
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.887
SUBAREA RUNOFF (CFS) = 0.43
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.43

******************************************************************************
FLOW PROCESS FROM NODE 212.00 TO NODE 210.00 IS CODE = 62
-----------------------------------------------------------------------------

>>>>> COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA <<<<<
>>>>> (STREET TABLE SECTION # 1 USED) <<<<<
-----------------------------------------------------------------------------

UPSTREAM ELEVATION (FEET) = 916.50 DOWNSTREAM ELEVATION (FEET) = 892.00
STREET LENGTH (FEET) = 695.00 CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

** TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.28
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.30
HALFSTREET FLOOD WIDTH (FEET) = 8.51
AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.89
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 1.15
STREET FLOW TRAVEL TIME (MIN.) = 2.97 Tc (MIN.) = 9.35
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.160
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5400
SUBAREA AREA (ACRES) = 1.70 SUBAREA RUNOFF (CFS) = 5.66
TOTAL AREA (ACRES) = 1.8 PEAK FLOW RATE (CFS) = 5.99

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.35 HALFSTREET FLOOD WIDTH (FEET) = 11.05
FLOW VELOCITY (FEET/SEC.) = 4.47 DEPTH*VELOCITY (FT*FT/SEC.) = 1.55
LONGEST FLOWPATH FROM NODE 211.00 TO NODE 210.00 = 745.00 FEET.

******************************************************************************
FLOW PROCESS FROM NODE 210.00 TO NODE 210.00 IS CODE = 1
-----------------------------------------------------------------------------

>>>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE <<<<<
>>>>> AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES <<<<<
-----------------------------------------------------------------------------

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 9.35
RAINFALL INTENSITY (INCH/HR) = 6.16
TOTAL STREAM AREA (ACRES) = 1.80
PEAK FLOW RATE (CFS) AT CONFLUENCE = 5.99

** CONFLUENCE DATA **
<table>
<thead>
<tr>
<th>STREAM</th>
<th>RUNOFF</th>
<th>Tc</th>
<th>INTENSITY</th>
<th>AREA</th>
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<tr>
<td>NUMBER</td>
<td>(CFS)</td>
<td>(MIN.)</td>
<td>(INCH/HOUR)</td>
<td>(ACRE)</td>
</tr>
<tr>
<td>1</td>
<td>18.48</td>
<td>10.42</td>
<td>5.742</td>
<td>5.80</td>
</tr>
<tr>
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<td>5.99</td>
<td>9.35</td>
<td>6.160</td>
<td>1.80</td>
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</tbody>
</table>

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

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM</th>
<th>RUNOFF</th>
<th>Tc</th>
<th>INTENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER</td>
<td>(CFS)</td>
<td>(MIN.)</td>
<td>(INCH/HOUR)</td>
</tr>
<tr>
<td>1</td>
<td>23.21</td>
<td>9.35</td>
<td>6.160</td>
</tr>
<tr>
<td>2</td>
<td>24.06</td>
<td>10.42</td>
<td>5.742</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 24.06 Tc (MIN.) = 10.42
TOTAL AREA (ACRES) = 7.6
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 210.00 = 1065.00 FEET.

FLOW PROCESS FROM NODE 210.00 TO NODE 213.00 IS CODE = 31

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA <<<<

ELEVATION DATA: UPSTREAM (FEET) = 887.50 DOWNSTREAM (FEET) = 864.00
FLOW LENGTH (FEET) = 58.00 MANNING'S N = 0.013
DEPT OF FLOW IN 18.0 INCH PIPE IS 7.7 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 33.43
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OFPIPES = 1
PIPE-FLOW (CFS) = 24.06
PIPE TRAVEL TIME (MIN.) = 0.03 Tc (MIN.) = 10.45
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 213.00 = 1123.00 FEET.

FLOW PROCESS FROM NODE 213.00 TO NODE 214.00 IS CODE = 51

>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW <<<<

ELEVATION DATA: UPSTREAM (FEET) = 864.00 DOWNSTREAM (FEET) = 720.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 2276.00 CHANNEL SLOPE = 0.0633
CHANNEL BASE (FEET) = 38.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH (FEET) = 3.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 3.486
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 43.95
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.12
AVERAGE FLOW DEPTH (FEET) = 0.36 TRAVEL TIME (MIN.) = 12.14
Tc (MIN.) = 22.59
SUBAREA AREA (ACRES) = 35.30 SUBAREA RUNOFF (CFS) = 36.92
AREA-AVERAGE RUNOFF COEFFICIENT = 0.343
TOTAL AREA (ACRES) = 42.9 PEAK FLOW RATE (CFS) = 51.22
END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.40  FLOW VELOCITY (FEET/SEC.) = 3.30
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 214.00 = 3399.00 FEET.

*******************************************************************************
FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 10
----------------------------------------------------------------------------
>>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
----------------------------------------------------------------------------
*******************************************************************************
FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 926.10
DOWNSTREAM ELEVATION (FEET) = 925.00
ELEVATION DIFFERENCE (FEET) = 1.10
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 5.480
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 8.692
SUBAREA RUNOFF (CFS) = 0.47
TOTAL AREA (ACRES) = 0.10  TOTAL RUNOFF (CFS) = 0.47
*******************************************************************************
FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION (FEET) = 925.00  DOWNSTREAM ELEVATION (FEET) = 890.00
STREET LENGTH (FEET) = 1353.00  CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020
SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200
**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 13.91
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.46
HALFSTREET FLOOD WIDTH (FEET) = 16.60
AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.84
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 2.22
STREET FLOW TRAVEL TIME (MIN.) = 4.66  Tc (MIN.) = 10.14
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.845
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.540  
SUBAREA AREA (ACRES) = 8.30  SUBAREA RUNOFF (CFS) = 26.20  
TOTAL AREA (ACRES) = 8.4  PEAK FLOW RATE (CFS) = 26.51  

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH (FEET) = 0.55  HALF STREET FLOOD WIDTH (FEET) = 23.89  
FLOW VELOCITY (FEET/SEC.) = 5.62  DEPTH*VELOCITY (FT*FT/SEC.) = 3.10  
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,  
AND L = 1353.0 FT WITH ELEVATION-DROP = 35.0 FT, IS 33.5 CFS,  
WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE 217.00  
LONGEST FLOWPATH FROM NODE 215.00 TO NODE 217.00 = 1403.00 FEET.  

*****************************************************************************  
FLOW PROCESS FROM NODE 217.00 TO NODE 218.00 IS CODE = 31  

>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  

ELEVATION DATA: UPSTREAM (FEET) = 884.00  DOWNSTREAM (FEET) = 883.60  
FLOW LENGTH (FEET) = 36.00  MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.2 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 8.75  
ESTIMATED PIPE DIAMETER (INCH) = 27.00  NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 26.51  
PIPE TRAVEL TIME (MIN.) = 0.07  Tc (MIN.) = 10.21  
LONGEST FLOWPATH FROM NODE 215.00 TO NODE 218.00 = 1439.00 FEET.  

*****************************************************************************  
FLOW PROCESS FROM NODE 218.00 TO NODE 218.00 IS CODE = 1  

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<  

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION (MIN.) = 10.21  
RAINFALL INTENSITY (INCH/HR) = 5.82  
TOTAL STREAM AREA (ACRES) = 8.40  
PEAK FLOW RATE (CFS) AT CONFLUENCE = 26.51  

*****************************************************************************  
FLOW PROCESS FROM NODE 219.00 TO NODE 220.00 IS CODE = 21  

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700  
SOIL CLASSIFICATION IS "C"  
S.C.S. CURVE NUMBER (AMC II) = 98  
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00  
UPSTREAM ELEVATION (FEET) = 912.00  
DOWNSTREAM ELEVATION (FEET) = 910.00  
ELEVATION DIFFERENCE (FEET) = 2.00  
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 1.844  
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 9.222  
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.  
SUBAREA RUNOFF (CFS) = 0.80  
TOTAL AREA (ACRES) = 0.10  TOTAL RUNOFF (CFS) = 0.80
FLOW PROCESS FROM NODE 220.00 TO NODE 218.00 IS CODE = 62

>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<

UPSTREAM ELEVATION (FEET) = 910.00 DOWNSTREAM ELEVATION (FEET) = 890.00
STREET LENGTH (FEET) = 873.00 CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 5.05**
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.35
HALFSTREET FLOOD WIDTH (FEET) = 11.29
AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.63
PRODUCT OF DEPTH & VELOCITY (FT*FT/SEC.) = 1.28
STREET FLOW TRAVEL TIME (MIN.) = 4.01 Tc (MIN.) = 5.85
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 8.329
RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5400
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 84
AREA-AVERAGE RUNOFF COEFFICIENT = 0.557
SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 8.10
TOTAL AREA (ACRES) = 1.9 PEAK FLOW RATE (CFS) = 8.82

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.41 HALFSTREET FLOOD WIDTH (FEET) = 14.18
FLOW VELOCITY (FEET/SEC.) = 4.14 DEPTH*VELOCITY (FT*FT/SEC.) = 1.70
LONGEST FLOWPATH FROM NODE 219.00 TO NODE 218.00 = 923.00 FEET.

FLOW PROCESS FROM NODE 218.00 TO NODE 218.00 IS CODE = 1

>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 5.85
RAINFALL INTENSITY (INCH/HR) = 8.33
TOTAL STREAM AREA (ACRES) = 1.90
PEAK FLOW RATE (CFS) AT CONFLUENCE = 8.82

** CONFLUENCE DATA **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HR)</th>
<th>AREA (ACRE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26.51</td>
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<td>8.40</td>
</tr>
<tr>
<td>2</td>
<td>8.82</td>
<td>5.85</td>
<td>8.329</td>
<td>1.90</td>
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</tbody>
</table>
RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>8.329</td>
</tr>
<tr>
<td>2</td>
<td>32.67</td>
<td>10.21</td>
<td>5.819</td>
</tr>
</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 32.67  Tc (MIN.) = 10.21
TOTAL AREA (ACRES) = 10.3
LONGEST FLOWPATH FROM NODE 215.00 TO NODE 218.00 = 1439.00 FEET.

FLOW PROCESS FROM NODE 218.00 TO NODE 221.00 IS CODE = 31

>>>

ELEVATION DATA: UPSTREAM (FEET) = 883.60 DOWNSTREAM (FEET) = 872.00
FLOW LENGTH (FEET) = 179.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.9 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 17.87
ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 32.67
PIPE TRAVEL TIME (MIN.) = 0.17  Tc (MIN.) = 10.38
LONGEST FLOWPATH FROM NODE 215.00 TO NODE 221.00 = 1618.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 IS CODE = 51

>>>

ELEVATION DATA: UPSTREAM (FEET) = 872.00 DOWNSTREAM (FEET) = 802.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 651.00 CHANNEL SLOPE = 0.1075
CHANNEL BASE (FEET) = 32.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH (FEET) = 3.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.905
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = 0.3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 38.16
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.70
AVERAGE FLOW DEPTH (FEET) = 0.32  TRAVEL TIME (MIN.) = 2.93
Tc (MIN.) = 13.30
SUBAREA AREA (ACRES) = 7.40  SUBAREA RUNOFF (CFS) = 10.89
AREA-AVERAGE RUNOFF COEFFICIENT = 0.442
TOTAL AREA (ACRES) = 17.7  PEAK FLOW RATE (CFS) = 38.34

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.32  FLOW VELOCITY (FEET/SEC.) = 3.72
LONGEST FLOWPATH FROM NODE 215.00 TO NODE 222.00 = 2269.00 FEET.

*****************************************************************************
FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 1

>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 13.30
RAINFALL INTENSITY (INCH/HR) = 4.91
TOTAL STREAM AREA (ACRES) = 17.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 38.34

FLOW PROCESS FROM NODE 223.00 TO NODE 224.00 IS CODE = 2

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
INITIAL SUBAREA FLOW-LENGTH (FEET) = 50.00
UPSTREAM ELEVATION (FEET) = 1016.00
DOWNSTREAM ELEVATION (FEET) = 1014.00
ELEVATION DIFFERENCE (FEET) = 2.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 6.415
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 7.853
SUBAREA RUNOFF (CFS) = 0.24
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.24

FLOW PROCESS FROM NODE 224.00 TO NODE 222.00 IS CODE = 51

>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

ELEVATION DATA: UPSTREAM (FEET) = 1014.00 DOWNSTREAM (FEET) = 802.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 2690.00 CHANNEL SLOPE = 0.0788
CHANNEL BASE (FEET) = 12.00 "Z" FACTOR = 10.000
MANNING'S FACTOR = 0.060 MAXIMUM DEPTH (FEET) = 3.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.045
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 37.63
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.89
AVERAGE FLOW DEPTH (FEET) = 0.55 TRAVEL TIME (MIN.) = 11.53
Tc (MIN.) = 17.94
SUBAREA AREA (ACRES) = 48.80 SUBAREA RUNOFF (CFS) = 71.06
AREA-AVERAGE RUNOFF COEFFICIENT = 0.360
TOTAL AREA (ACRES) = 48.9 PEAK FLOW RATE (CFS) = 71.18

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.77 FLOW VELOCITY (FEET/SEC.) = 4.66
LONGEST FLOWPATH FROM NODE 223.00 TO NODE 222.00 = 2740.00 FEET.
DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE

AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION (MIN.) = 17.94
RAINFALL INTENSITY (INCH/HR) = 4.04
TOTAL STREAM AREA (ACRES) = 48.90
PEAK FLOW RATE (CFS) AT CONFLUENCE = 71.18

** CONFLUENCE DATA **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>38.34</td>
<td>13.30</td>
<td>4.905</td>
<td>17.70</td>
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<tr>
<td>2</td>
<td>71.18</td>
<td>17.94</td>
<td>4.045</td>
<td>48.90</td>
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RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
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<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
</tr>
</thead>
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<td>2</td>
<td>102.79</td>
<td>17.94</td>
<td>4.045</td>
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</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 102.79  Tc (MIN.) = 17.94
TOTAL AREA (ACRES) = 66.6
LONGEST FLOWPATH FROM NODE 223.00 TO NODE 222.00 = 2740.00 FEET.

FLOW PROCESS FROM NODE 222.00 TO NODE 225.00 IS CODE = 51

TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)

ELEVATION DATA: UPSTREAM (FEET) = 802.00  DOWNSTREAM (FEET) = 788.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 542.00  CHANNEL SLOPE = 0.0258
CHANNEL BASE (FEET) = 10.00  "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH (FEET) = 3.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 3.788
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 105.18
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.70
AVERAGE FLOW DEPTH (FEET) = 1.68  TRAVEL TIME (MIN.) = 1.92
Tc (MIN.) = 19.86
SUBAREA AREA (ACRES) = 4.20  SUBAREA RUNOFF (CFS) = 4.77
AREA-AVERAGE RUNOFF COEFFICIENT = 0.377
TOTAL AREA (ACRES) = 70.8  PEAK FLOW RATE (CFS) = 102.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.66  FLOW VELOCITY (FEET/SEC.) = 4.65
LONGEST FLOWPATH FROM NODE 223.00 TO NODE 225.00 = 3282.00 FEET.
FLOW PROCESS FROM NODE  225.00 TO NODE  225.00 IS CODE =  1

 hypothetical independent stream for confluence

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  19.86
RAINFALL INTENSITY(INCH/HR) =  3.79
TOTAL STREAM AREA(ACRES) =  70.80
PEAK FLOW RATE(CFS) AT CONFLUENCE =  102.79

FLOW PROCESS FROM NODE  226.00 TO NODE  227.00 IS CODE =  21

RATIONAL METHOD INITIAL SUBAREA ANALYSIS

CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) =  71
INITIAL SUBAREA FLOW-LENGTH(FEET) =  50.00
UPSTREAM ELEVATION(FEET) =  954.00
DOWNSTREAM ELEVATION(FEET) =  950.00
ELEVATION DIFFERENCE(FEET) =  4.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =  5.092
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.114
SUBAREA RUNOFF(CFS) =  0.27
TOTAL AREA(ACRES) =  0.10  TOTAL RUNOFF(CFS) =  0.27

FLOW PROCESS FROM NODE  227.00 TO NODE  225.00 IS CODE =  51

COMPUTE TRAPEZOIDAL CHANNEL FLOW

ELEVATION DATA: UPSTREAM(FEET) =  950.00  DOWNSTREAM(FEET) =  788.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1895.00  CHANNEL SLOPE =  0.0855
CHANNEL BASE(FEET) =  10.00  "Z" FACTOR =  3.000
MANNING'S FACTOR =  0.060  MAXIMUM DEPTH(FEET) =  3.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.725
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) =  76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  14.70
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.51
AVERAGE FLOW DEPTH(FEET) =  0.38  TRAVEL TIME(MIN.) =  9.01
Tc(MIN.) =  14.10
SUBAREA AREA(ACRES) =  16.00  SUBAREA RUNOFF(CFS) =  27.21
AREA-AVERAGE RUNOFF COEFFICIENT =  0.360
TOTAL AREA(ACRES) =  16.1  PEAK FLOW RATE(CFS) =  27.36

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.54  FLOW VELOCITY(FEET/SEC.) =  4.37
LONGEST FLOWPATH FROM NODE  226.00 TO NODE  225.00 =  1945.00 FEET.
DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE
AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 14.10
RAINFALL INTENSITY (INCH/HR) = 4.72
TOTAL STREAM AREA (ACRES) = 16.10
PEAK FLOW RATE (CFS) AT CONFLUENCE = 27.36

** CONFLUENCE DATA **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>2</td>
<td>27.36</td>
<td>14.10</td>
<td>4.725</td>
<td>16.10</td>
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RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

<table>
<thead>
<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
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<tbody>
<tr>
<td>1</td>
<td>109.77</td>
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<tr>
<td>2</td>
<td>124.72</td>
<td>19.86</td>
<td>3.788</td>
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</tbody>
</table>

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 124.72  Tc (MIN.) = 19.86
TOTAL AREA (ACRES) = 86.9
LONGEST FLOWPATH FROM NODE 223.00 TO NODE 225.00 = 3282.00 FEET.

FLOW PROCESS FROM NODE 225.00 TO NODE 214.00 IS CODE = 51

TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)

ELEVATION DATA: UPSTREAM (FEET) = 788.00  DOWNSTREAM (FEET) = 720.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 1205.00  CHANNEL SLOPE = 0.0564
CHANNEL BASE (FEET) = 25.00  "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH (FEET) = 4.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 3.376
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = 0.3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 131.77
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.17
AVERAGE FLOW DEPTH (FEET) = 0.92  TRAVEL TIME (MIN.) = 3.89
Tc (MIN.) = 23.75
SUBAREA AREA (ACRES) = 13.90  SUBAREA RUNOFF (CFS) = 14.08
AREA-AVERAGE RUNOFF COEFFICIENT = 0.363
TOTAL AREA (ACRES) = 100.8  PEAK FLOW RATE (CFS) = 124.72

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.89  FLOW VELOCITY (FEET/SEC.) = 5.08
LONGEST FLOWPATH FROM NODE 223.00 TO NODE 214.00 = 4487.00 FEET.
FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 11

>>>>> CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY <<<<<

** MAIN STREAM CONFLUENCE DATA **

<table>
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<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
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</table>

LONGEST FLOWPATH FROM NODE 223.00 TO NODE 214.00 = 4487.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

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<tr>
<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
<th>AREA (ACRE)</th>
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LONGEST FLOWPATH FROM NODE 205.00 TO NODE 214.00 = 3399.00 FEET.

** PEAK FLOW RATE TABLE **

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<th>STREAM NUMBER</th>
<th>RUNOFF (CFS)</th>
<th>Tc (MIN.)</th>
<th>INTENSITY (INCH/HOUR)</th>
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<tr>
<td>2</td>
<td>174.32</td>
<td>23.75</td>
<td>3.376</td>
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</table>

Computed confluence estimates are as follows:
PEAK FLOW RATE (CFS) = 174.32   Tc (MIN.) = 23.75
TOTAL AREA (ACRES) = 143.7

FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 12

>>>>> CLEAR MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 214.00 TO NODE 1132.00 IS CODE = 51

>>>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW <<<<<

ELEVATION DATA: UPSTREAM (FEET) = 720.00  DOWNSTREAM (FEET) = 636.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 769.00  CHANNEL SLOPE = 0.1092
CHANNEL BASE (FEET) = 12.00  "Z" FACTOR = 6.000
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH (FEET) = 4.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 3.228
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 179.70
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.53
AVERAGE FLOW DEPTH (FEET) = 1.23  TRAVEL TIME (MIN.) = 1.70
Tc (MIN.) = 25.45
SUBAREA AREA (ACRES) = 11.10  SUBAREA RUNOFF (CFS) = 10.75
AREA-AVERAGE RUNOFF COEFFICIENT = 0.353
TOTAL AREA (ACRES) = 154.8  PEAK FLOW RATE (CFS) = 176.45

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.22  FLOW VELOCITY (FEET/SEC.) = 7.50
LONGEST FLOWPATH FROM NODE 223.00 TO NODE 1132.00 = 5256.00 FEET.

FLOW PROCESS FROM NODE 1132.00 TO NODE 1132.00 IS CODE = 10

>>> MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<

FLOW PROCESS FROM NODE 1133.00 TO NODE 1134.00 IS CODE = 21

LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 74
INITIAL SUBAREA FLOW-LENGTH(Feet) = 50.00
UPSTREAM ELEVATION(Feet) = 920.00
DOWNSTREAM ELEVATION(Feet) = 916.00
ELEVATION DIFFERENCE(Feet) = 4.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.092
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 9.114
SUBAREA RUNOFF(CFS) = 0.27
TOTAL AREA(ACRES) = 0.10  TOTAL RUNOFF(CFS) = 0.27

FLOW PROCESS FROM NODE 1134.00 TO NODE 1132.00 IS CODE = 51

COMPUTE TRAPEZOIDAL CHANNEL FLOW

ELEVATION DATA: UPSTREAM(Feet) = 916.00  DOWNSTREAM(Feet) = 636.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 2324.00  CHANNEL SLOPE = 0.1205
CHANNEL BASE(Feet) = 16.00  "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.060  MAXIMUM DEPTH(Feet) = 5.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.523
CHAPARRAL (BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 71
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.96
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/SEC.) = 3.87
AVERAGE FLOW DEPTH(Feet) = 0.31  TRAVEL TIME(MIN.) = 10.00
Tc(MIN.) = 15.09
SUBAREA AREA(ACRES) = 26.50  SUBAREA RUNOFF(CFS) = 35.96
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 26.6  PEAK FLOW RATE(CFS) = 36.09

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.45  FLOW VELOCITY(Feet/SEC.) = 4.80
LONGEST FLOWPATH FROM NODE 1133.00 TO NODE 1132.00 = 2374.00 FEET.

FLOW PROCESS FROM NODE 1132.00 TO NODE 1132.00 IS CODE = 11

CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY
** MAIN STREAM CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY     AREA
NUMBER     (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
1       36.09    15.09       4.523       26.60
LONGEST FLOWPATH FROM NODE 1133.00 TO NODE 1132.00 = 2374.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY     AREA
NUMBER     (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
1      316.83    19.55       3.827      209.60
LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1132.00 = 6240.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc      INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
1     280.60      15.09        4.523
2     347.37      19.55        3.827
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 347.37  Tc (MIN.) = 19.55
TOTAL AREA (ACRES) = 236.2

****************************************************************************
FLOW PROCESS FROM NODE 1132.00 TO NODE 1132.00 IS CODE = 11
----------------------------------------------------------------------------
>>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<
============================================================================

** MAIN STREAM CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY     AREA
NUMBER     (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
1      347.37    19.55       3.827      236.20
LONGEST FLOWPATH FROM NODE 1106.00 TO NODE 1132.00 = 6240.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY     AREA
NUMBER     (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
1     176.45    25.45       3.228      154.80
LONGEST FLOWPATH FROM NODE 223.00 TO NODE 1132.00 = 5256.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc      INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
1     482.92      19.55        3.827
2     469.49      25.45        3.228
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 482.92  Tc (MIN.) = 19.55
TOTAL AREA (ACRES) = 391.0

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FLOW PROCESS FROM NODE 1132.00 TO NODE 1132.00 IS CODE = 12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
FLOW PROCESS FROM NODE 1132.00 TO NODE 1132.00 IS CODE = 12

------------------------------------------------------------------------

>>>>>>CLEAR MEMORY BANK # 2 <<<<<

============================================================================

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 391.0  TC(MIN.) = 19.55
PEAK FLOW RATE (CFS) = 482.92*

============================================================================

END OF RATIONAL METHOD ANALYSIS

• PEAK DISCHARGE REAL IS UNMITIGATED. The proposed detention basin and its
  outlet structure will regulate the out flow to no more than 78 cfs such
  that the overall discharge from the site at the final discharge point is
  not greater than that under the pre-development conditions.
FLOOD ROUTING ANALYSIS

ACCORDING TO COUNTY OF SAN DIEGO
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Ver. 10.0 Release Date: 01/01/2004 License ID 1503

Analysis prepared by:

LANDMARK CONSULTING
9555 GENESEE AVE. SUITE 200
SAN DIEGO, CA 92121
TEL: 858-587-8070, FAX: 858-587-8750

************************** DESCRIPTION OF STUDY **************************
* LILAC HILLS RANCH *
* IMPLEMENTATION TM *
* PRE-DEVELOPMENT CONDITIONS *
**************************************************************************

FILE NAME: 1037I1X.DAT
TIME/DATE OF STUDY: 15:46 04/04/2012

FLOW PROCESS FROM NODE 101.00 TO NODE 118.00 IS CODE = 1

>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<

(WATERCOURSE LENGTH = 6176.000 FEET
LENGTH FROM CONCENTRATION POINT TO CENTROID = 2613.000 FEET
ELEVATION VARIATION ALONG WATERCOURSE = 406.000 FEET
BASIN FACTOR = 0.030
WATERSHED AREA = 396.270 ACRES
BASEFLOW = 0.000 CFS/SQUARE-MILE
WATERCOURSE "LAG" TIME = 0.192 HOURS

* Instantaneous Unit-Hydrograph Option Selected.
CAUTION: LAG TIME IS LESS THAN 0.75 HOURS.
THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
S.C.S. S-GRAPH SELECTED
WATERSHED RUNOFF CURVE NUMBER = 85.00

SPECIFIED PEAK 5-MINUTES RAINFALL(INCH) = 0.77
SPECIFIED PEAK 30-MINUTES RAINFALL(INCH) = 1.45
SPECIFIED PEAK 1-HOUR RAINFALL(INCH) = 1.86
SPECIFIED PEAK 3-HOUR RAINFALL(INCH) = 2.74
SPECIFIED PEAK 6-HOUR RAINFALL(INCH) = 3.50
SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 6.00
24-HOUR NESTED DESIGN STORM DISTRIBUTION SELECTED
(Ref: San Diego County Hydrology Manual)
PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
5-MINUTE FACTOR = 0.993
30-MINUTE FACTOR = 0.993
1-HOUR FACTOR = 0.996
3-HOUR FACTOR = 0.998
6-HOUR FACTOR = 0.998
24-HOUR FACTOR = 0.999

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 43.290

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TOTAL SOIL-LOSS (INCHES) = 1.70
TOTAL EFFECTIVE RAINFALL (INCHES) = 4.30

TOTAL SOIL-LOSS VOLUME (ACRE-FEET) = 56.0411
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END OF FLOODSCx ROUTING ANALYSIS
100-YEAR HYDROGRAPH CALCULATIONS
POST-DEVELOPMENT CONDITIONS

******************************************************************************
F L O O D    R O U T I N G     A N A L Y S I S

ACCORDING TO COUNTY OF SAN DIEGO
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Ver. 10.0 Release Date: 01/01/2004 License ID 1503

Analysis prepared by:

LANDMARK CONSULTING
9555 GENESEE AVE. SUITE 200
SAN DIEGO, CA 92121
TEL: 858-587-8070, FAX: 858-587-8750

************************** DESCRIPTION OF STUDY **************************
* LILAC HILLS RANCH 
* IMPLEMENTATION TM 
* POST-DEVELOPMENT CONDITIONS 

FILE NAME: 1037I1P.DAT
TIME/DATE OF STUDY: 15:56 04/04/2012

******************************************************************************
FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =   1

>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<

(WATERCOURSE LENGTH = 6606.000 FEET
LENGTH FROM CONCENTRATION POINT TO CENTROID = 3090.000 FEET
ELEVATION VARIATION ALONG WATERCOURSE = 406.000 FEET
BASIN FACTOR = 0.015
WATERSHED AREA = 396.300 ACRES
BASEFLOW = 0.000 CFS/SQUARE-MILE
WATERCOURSE "LAG" TIME = 0.107 HOURS

* Instantaneous Unit-Hydrograph Option Selected.
 CAUTION: LAG TIME IS LESS THAN 0.75 HOURS.
 THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM) 
 MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
S.C.S. S-GRAPH SELECTED
WATERSHED RUNOFF CURVE NUMBER = 87.00

SPECIFIED PEAK 5-MINUTES RAINFALL(INCH) = 0.77
SPECIFIED PEAK 30-MINUTES RAINFALL(INCH) = 1.45
SPECIFIED PEAK 1-HOUR RAINFALL(INCH) = 1.86
SPECIFIED PEAK 3-HOUR RAINFALL(INCH) = 2.74
SPECIFIED PEAK 6-HOUR RAINFALL(INCH) = 3.50
SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 6.00

145
24-HOUR NESTED DESIGN STORM DISTRIBUTION SELECTED  
(Ref: San Diego County Hydrology Manual)

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
  5-MINUTE FACTOR = 0.993  
  30-MINUTE FACTOR = 0.993  
  1-HOUR FACTOR = 0.996  
  3-HOUR FACTOR = 0.998  
  6-HOUR FACTOR = 0.998  
  24-HOUR FACTOR = 0.999

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES  
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 78.179

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TOTAL STORM RAINFALL (INCHES) = 5.99
TOTAL SOIL-LOSS (INCHES) = 1.48
TOTAL EFFECTIVE RAINFALL (INCHES) = 4.51

TOTAL SOIL-LOSS VOLUME (ACRE-FEET) = 48.9587
TOTAL STORM RUNOFF VOLUME (ACRE- FEET) = 150.5591
## 24-Hour Storm Runoff Hydrograph

HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS (CFS)
(Note: Time indicated is at END of Each Unit Intervals)

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END OF FLOODSCx ROUTING ANALYSIS
APPENDIX
HYDROLOGY MAPS
ADDENDUM

ALTERNATIVE TO DETENTION BASINS

The developer has proposed a few alternative measures to augment or enhance the storm water runoff volume attenuation methods. In recent years, new technologies have become available to better retain and store excess runoff volume such as rain barrels, bio-retention (see page 166 – Typical Residential Lot Rain Water Capturing Schematic) and permeable pavers (see page 165 – Typical Permeable Paver Section). These rain capturing measures will not only reduce the project’s hydrologic and subsequent development footprint but also reduce the water demand of the project since the captured runoff will be used for irrigation.

ASSUMPTIONS:

Bio-retention:

- Average lot size = 4500 sf
- Average impervious coverage per lot = 1500 sf roof + 300 sf walkways and driveway = 1800 sf
- Typical pervious coverage (bio-retention) per lot = 1000 sf with the top 12” layer providing a minimum of 5”/hour infiltration rate.
- Typical void ratio of engineered infiltration material = 0.55

Rain barrels:

- Typical home rain gutter down spout location = 4
- Typical rain barrel capacity = 50 gal.

Permeable pavers:

- Average permeable paver section: 2” bedding+4” no. 57 stone base + 24” no.2 stone subbase
- Average permeable paver base void ratio = 0.4
- Typical storage volume under each square foot of pavers = 1.0 cf

Project design:

- Proposed residential units = 352 (Phase 1 only)

ANALYSIS:

Typical Lot rainwater capturing/retention calculations:

Bio-retention volume per typical home:1000 sf x 12”/12 x 0.55 void ratio = 550 cf.

Total bio-retention vol. = 550 cf x 352 SFR homes = 193600 cf = 4.4 Ac-Ft.
Rain barrel capacity = 4 x 50gal = 200 gal = 27 cf

Total rain barrel capturing capacity = 27 cf x 352 SFR homes = 9500 cf = 0.2 Ac-Ft.

Total lot rain capturing capacity for the development = 4.4 + 0.2 = 4.6 Ac-Ft.

**Permeable Pavers:**

The developer proposes to install a total of 23 acres of permeable pavers throughout the entire project, only a portion of the 23 acres of pavers will be deployed for this Implementing tentative map, the rest will be installed in later phases throughout the project.

The project will need to install a minimum of 4.8 acres of permeable pavers, in additions to the rain barrels on each lot, to achieve the 9.4 Ac-Ft of total storage space. The combined capacity will eliminate the required detention basin for 100-year runoff attenuation purposes.

Total alternative storage capacity = rain barrels + bio-retention + permeable pavers = 4.6 + 4.8 = 9.4 Ac-Ft.

**CONCLUSION:**

These permeable pavers, bio-retention and rain barrels offer a great alternative to the proposed detention basins for 100-year runoff volume attenuation.

The project developers projected a total of 23 acres of pavers throughout the project. Per the calculations presented in this report, the proposed rain barrels, bio-retention areas and permeable pavers will provide adequate storage capacity to eliminate the required detention basin for 100-year storm water runoff volume attenuation purposes. It is possible to eliminate the proposed large detention basins and reduce the project foot print with the deployment of these alternative methods. Additionally, the captured rainwater in the bio-retention areas and rain barrels will offset the irrigation water demand of the project to make it a more sustainable development.
LILAC HILLS RANCH
TYPICAL RESIDENTIAL LOT RAIN WATER
CAPTURING SCHEMATIC

LANDSCAPED AREA
WITH 12" OF
ENGINEERED SOIL WITH
5"/HR. FILTRATION
RATE FOR
BIO-RETENTION

50-GAL RAIN
BARREL AT
DOWN SPOUT
(TYP.)

PAVED PATIO

ROOF TOP

CONC.
WALK

CONC.
WALK

CONC.
DRIVEWAY

LANDSCAPED
SLOPES (TYP.)

FRONTAGE STREET

LANDMARK
CONSULTING
Planning Engineering Surveying
9556 Genesee Avenue, Suite 200
San Diego, CA 92121, (619) 587-8070