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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* RMV PA-3 SUBAREA A ROMP 2018 \*  
\* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
\* 100-YR HC AUGUST 2018 ROKAMOTO \*  
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FILE NAME: PA3A00HC.DAT  
TIME/DATE OF STUDY: 08:22 08/14/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*DATA BANK RAINFALL USED\*  
\*ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD\*

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	STREET-CROSSFALL: HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
2	32.0	27.0	0.020/0.020/ ---	0.67	2.00	0.0312	0.167	0.0150
3	13.0	8.0	0.020/0.020/ ---	0.33	1.00	0.0312	0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21  
-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 327.00  
ELEVATION DATA: UPSTREAM(FEET) = 725.00 DOWNSTREAM(FEET) = 642.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.413  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.306  
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "OPEN BRUSH"	C	1.10	0.25	1.000	92	9.41

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA RUNOFF(CFS) = 4.02  
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 4.02

OA-1

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FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 51  
-----  
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<<  
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<<  
=====

ELEVATION DATA: UPSTREAM(FEET) = 642.00 DOWNSTREAM(FEET) = 605.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 385.00 CHANNEL SLOPE = 0.0961  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.047

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SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	C	0.90	0.25	1.000	91
NATURAL FAIR COVER "OPEN BRUSH"	C	2.60	0.25	1.000	92
RESIDENTIAL ".4 DWELLING/ACRE"	C	0.70	0.25	0.900	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.983  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.20  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.98  
AVERAGE FLOW DEPTH(FEET) = 0.79 TRAVEL TIME(MIN.) = 1.07  
Tc(MIN.) = 10.49  
SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 14.37  
EFFECTIVE AREA(ACRES) = 5.30 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.99  
TOTAL AREA(ACRES) = 5.3 PEAK FLOW RATE(CFS) = 18.13

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 0.95 FLOW VELOCITY(FEET/SEC.) = 6.71  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 712.00 FEET.

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FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 62  
-----  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<<  
=====

UPSTREAM ELEVATION(FEET) = 605.00 DOWNSTREAM ELEVATION(FEET) = 584.00  
STREET LENGTH(FEET) = 264.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALfstREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.70  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.39  
HALFSTREET FLOOD WIDTH(FEET) = 12.46  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 6.87  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.64  
STREET FLOW TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 11.13  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.912

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SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
".4 DWELLING/ACRE" C 1.10 0.25 0.900 86  
COMMERCIAL C 1.00 0.25 0.100 86  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.519  
SUBAREA AREA(ACRES) = 2.10 SUBAREA RUNOFF(CFS) = 7.15  
EFFECTIVE AREA(ACRES) = 7.40 AREA-AVERAGED Fm(INCH/HR) = 0.21  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.85  
TOTAL AREA(ACRES) = 7.4 PEAK FLOW RATE(CFS) = 24.63

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.40 HALFSTREET FLOOD WIDTH(FEET) = 13.16  
FLOW VELOCITY(FEET/SEC.) = 7.07 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.81  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 976.00 FEET.

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FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 62  
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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>(STREET TABLE SECTION # 1 USED)<<<<<  
=====

UPSTREAM ELEVATION(FEET) = 584.00 DOWNSTREAM ELEVATION(FEET) = 564.00  
STREET LENGTH(FEET) = 494.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALfstREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 40.49  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.50

HALFSTREET FLOOD WIDTH(FEET) = 18.63  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 6.15  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 3.04  
STREET FLOW TRAVEL TIME(MIN.) = 1.34 Tc(MIN.) = 12.47  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.666

A-2

SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 1.10 0.30 0.100 76  
RESIDENTIAL  
".4 DWELLING/ACRE" B 0.30 0.30 0.900 76  
COMMERCIAL C 6.60 0.25 0.100 86  
RESIDENTIAL  
".4 DWELLING/ACRE" C 1.80 0.25 0.900 86  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.271  
SUBAREA AREA(ACRES) = 9.80 SUBAREA RUNOFF(CFS) = 31.71  
EFFECTIVE AREA(ACRES) = 17.20 AREA-AVERAGED Fm(INCH/HR) = 0.13  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 54.70

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 20.98  
FLOW VELOCITY(FEET/SEC.) = 6.63 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.56  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 1470.00 FEET.

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FLOW PROCESS FROM NODE 104.00 TO NODE 105.00 IS CODE = 31  
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
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ELEVATION DATA: UPSTREAM(FEET) = 564.00 DOWNSTREAM(FEET) = 520.00  
FLOW LENGTH(FEET) = 1456.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.34  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 54.70  
PIPE TRAVEL TIME(MIN.) = 1.58 Tc(MIN.) = 14.05  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2926.00 FEET.

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FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81  
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
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MAINLINE Tc(MIN.) = 14.05  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.423  
SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 0.60 0.30 0.100 76  
COMMERCIAL C 3.90 0.25 0.100 86  
PUBLIC PARK C 0.20 0.25 0.850 86  
RESIDENTIAL  
".4 DWELLING/ACRE" C 0.90 0.25 0.900 86  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.255

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SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 16.93  
EFFECTIVE AREA (ACRES) = 22.80 AREA-AVERAGED Fm (INCH/HR) = 0.12  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.46  
TOTAL AREA (ACRES) = 22.8 PEAK FLOW RATE (CFS) = 67.88

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FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 14.05  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.423 **A-4**  
SUBAREA LOSS RATE DATA (AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 0.60 0.30 0.100 76  
PUBLIC PARK B 0.30 0.30 0.850 76  
RESIDENTIAL  
".4 DWELLING/ACRE" B 0.40 0.30 0.900 76  
COMMERCIAL C 5.00 0.25 0.100 86  
PUBLIC PARK C 2.10 0.25 0.850 86  
RESIDENTIAL  
".4 DWELLING/ACRE" C 0.80 0.25 0.900 86  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.26  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400  
SUBAREA AREA (ACRES) = 9.20 SUBAREA RUNOFF (CFS) = 27.48  
EFFECTIVE AREA (ACRES) = 32.00 AREA-AVERAGED Fm (INCH/HR) = 0.11  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.44  
TOTAL AREA (ACRES) = 32.0 PEAK FLOW RATE (CFS) = 95.36

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FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 14.05  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.423 **A-4**  
SUBAREA LOSS RATE DATA (AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL D 1.80 0.20 0.100 91  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.20  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 5.51  
EFFECTIVE AREA (ACRES) = 33.80 AREA-AVERAGED Fm (INCH/HR) = 0.11  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.42  
TOTAL AREA (ACRES) = 33.8 PEAK FLOW RATE (CFS) = 100.88

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FLOW PROCESS FROM NODE 105.00 TO NODE 106.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 520.00 DOWNSTREAM (FEET) = 503.00  
FLOW LENGTH (FEET) = 804.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.5 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 15.51

ESTIMATED PIPE DIAMETER (INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 100.88  
PIPE TRAVEL TIME (MIN.) = 0.86 Tc (MIN.) = 14.91  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 3730.00 FEET.

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FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 14.91  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.308 **A-5**  
SUBAREA LOSS RATE DATA (AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 2.80 0.30 0.100 76  
COMMERCIAL C 7.60 0.25 0.100 86  
PUBLIC PARK C 0.40 0.25 0.850 86  
COMMERCIAL D 10.50 0.20 0.100 91  
RESIDENTIAL  
".4 DWELLING/ACRE" D 0.30 0.20 0.900 91  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.125  
SUBAREA AREA (ACRES) = 21.60 SUBAREA RUNOFF (CFS) = 63.75  
EFFECTIVE AREA (ACRES) = 55.40 AREA-AVERAGED Fm (INCH/HR) = 0.08  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.31  
TOTAL AREA (ACRES) = 55.4 PEAK FLOW RATE (CFS) = 161.12

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FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 14.91  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.308 **A-6**  
SUBAREA LOSS RATE DATA (AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 6.80 0.30 0.100 76  
COMMERCIAL C 12.10 0.25 0.100 86  
PUBLIC PARK C 1.00 0.25 0.850 86  
COMMERCIAL D 4.50 0.20 0.100 91  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.131  
SUBAREA AREA (ACRES) = 24.40 SUBAREA RUNOFF (CFS) = 71.91  
EFFECTIVE AREA (ACRES) = 79.80 AREA-AVERAGED Fm (INCH/HR) = 0.06  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.25  
TOTAL AREA (ACRES) = 79.8 PEAK FLOW RATE (CFS) = 233.03

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FLOW PROCESS FROM NODE 106.00 TO NODE 107.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 503.00 DOWNSTREAM (FEET) = 485.00  
FLOW LENGTH (FEET) = 808.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.7 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 19.21  
ESTIMATED PIPE DIAMETER (INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 233.03  
PIPE TRAVEL TIME (MIN.) = 0.70 Tc (MIN.) = 15.61  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 107.00 = 4538.00 FEET.

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FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 15.61  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.222 **A-8**  
SUBAREA LOSS RATE DATA (AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 3.40 0.30 0.100 76  
COMMERCIAL C 6.70 0.25 0.100 86  
PUBLIC PARK C 0.10 0.25 0.850 86  
COMMERCIAL D 2.50 0.20 0.100 91  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.106  
SUBAREA AREA (ACRES) = 12.70 SUBAREA RUNOFF (CFS) = 36.52  
EFFECTIVE AREA (ACRES) = 92.50 AREA-AVERAGED Fm (INCH/HR) = 0.06  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.23  
TOTAL AREA (ACRES) = 92.5 PEAK FLOW RATE (CFS) = 263.38

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FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 15.61  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.222 **A-7**  
SUBAREA LOSS RATE DATA (AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 7.20 0.30 0.100 76  
PUBLIC PARK B 0.70 0.30 0.850 76  
COMMERCIAL C 7.60 0.25 0.100 86  
PUBLIC PARK C 0.30 0.25 0.850 86  
COMMERCIAL D 4.70 0.20 0.100 91  
PUBLIC PARK D 0.40 0.20 0.850 91  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.26  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.150  
SUBAREA AREA (ACRES) = 20.90 SUBAREA RUNOFF (CFS) = 59.88  
EFFECTIVE AREA (ACRES) = 113.40 AREA-AVERAGED Fm (INCH/HR) = 0.05  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.22  
TOTAL AREA (ACRES) = 113.4 PEAK FLOW RATE (CFS) = 323.26

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FLOW PROCESS FROM NODE 107.00 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) = 485.00 DOWNSTREAM (FEET) = 480.00  
FLOW LENGTH (FEET) = 933.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 75.0 INCH PIPE IS 60.5 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 12.19  
ESTIMATED PIPE DIAMETER (INCH) = 75.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 323.26  
PIPE TRAVEL TIME (MIN.) = 1.28 Tc (MIN.) = 16.89  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 108.00 = 5471.00 FEET.

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FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 16.89  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.080 **A-18**  
SUBAREA LOSS RATE DATA (AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 3.50 0.30 0.100 76  
RESIDENTIAL  
".4 DWELLING/ACRE" B 0.60 0.30 0.900 76  
COMMERCIAL C 2.80 0.25 0.100 86  
RESIDENTIAL  
".4 DWELLING/ACRE" C 0.80 0.25 0.900 86  
COMMERCIAL D 0.60 0.20 0.100 91  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.27  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.235  
SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 22.53  
EFFECTIVE AREA (ACRES) = 121.70 AREA-AVERAGED Fm (INCH/HR) = 0.06  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.22  
TOTAL AREA (ACRES) = 121.7 PEAK FLOW RATE (CFS) = 331.32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 16.89  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.080 **A-9**  
SUBAREA LOSS RATE DATA (AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
APARTMENTS B 0.40 0.30 0.200 76  
APARTMENTS C 5.50 0.25 0.200 86  
APARTMENTS D 3.20 0.20 0.200 91  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 24.84  
EFFECTIVE AREA (ACRES) = 130.80 AREA-AVERAGED Fm (INCH/HR) = 0.05  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.22  
TOTAL AREA (ACRES) = 130.8 PEAK FLOW RATE (CFS) = 356.16

\*\*\*\*\*  
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.) = 16.89  
RAINFALL INTENSITY(INCH/HR) = 3.08  
AREA-AVERAGED Fm(INCH/HR) = 0.05  
AREA-AVERAGED Fp(INCH/HR) = 0.25  
AREA-AVERAGED Ap = 0.22  
EFFECTIVE STREAM AREA(ACRES) = 130.80  
TOTAL STREAM AREA(ACRES) = 130.80  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 356.16

\*\*\*\*\*  
FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00  
ELEVATION DATA: UPSTREAM(FEET) = 645.00 DOWNSTREAM(FEET) = 625.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.417  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.910

A-10

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
" .4 DWELLING/ACRE"	C	0.40	0.25	0.900	86	8.68
COMMERCIAL	D	0.30	0.20	0.100	91	5.42
PUBLIC PARK	D	1.30	0.20	0.850	91	8.61
RESIDENTIAL						
" .4 DWELLING/ACRE"	D	1.00	0.20	0.900	91	8.68

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.798  
SUBAREA RUNOFF(CFS) = 15.51  
TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 15.51

\*\*\*\*\*  
FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 62  
-----

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

=====

UPSTREAM ELEVATION(FEET) = 625.00 DOWNSTREAM ELEVATION(FEET) = 595.00  
STREET LENGTH(FEET) = 517.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.54  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.41  
HALFSTREET FLOOD WIDTH(FEET) = 14.02

AVERAGE FLOW VELOCITY(FEET/SEC.) = 6.29  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.60  
STREET FLOW TRAVEL TIME(MIN.) = 1.37 Tc(MIN.) = 6.79  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.194

A-11

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	2.30	0.25	0.100	86
RESIDENTIAL					
" .4 DWELLING/ACRE"	C	0.30	0.25	0.900	86
COMMERCIAL	D	1.00	0.20	0.100	91
RESIDENTIAL					
" .4 DWELLING/ACRE"	D	0.30	0.20	0.900	91

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.223  
SUBAREA AREA(ACRES) = 3.90 SUBAREA RUNOFF(CFS) = 18.05  
EFFECTIVE AREA(ACRES) = 6.90 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.47  
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 31.63

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.66  
FLOW VELOCITY(FEET/SEC.) = 6.63 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.93  
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 112.00 = 847.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 112.00 TO NODE 113.00 IS CODE = 62  
-----

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

=====

UPSTREAM ELEVATION(FEET) = 595.00 DOWNSTREAM ELEVATION(FEET) = 585.00  
STREET LENGTH(FEET) = 389.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 49.43

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.56  
HALFSTREET FLOOD WIDTH(FEET) = 22.07  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.44  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 3.03

STREET FLOW TRAVEL TIME(MIN.) = 1.19 Tc(MIN.) = 7.98  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.734

A-12

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	5.00	0.25	0.100	86
RESIDENTIAL					
" .4 DWELLING/ACRE"	C	2.20	0.25	0.900	86

COMMERCIAL D 1.00 0.20 0.100 91  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" D 0.30 0.20 0.900 91  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335  
 SUBAREA AREA (ACRES) = 8.50 SUBAREA RUNOFF (CFS) = 35.59  
 EFFECTIVE AREA (ACRES) = 15.40 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA (ACRES) = 15.4 PEAK FLOW RATE (CFS) = 64.36

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH (FEET) = 0.60 HALFSTREET FLOOD WIDTH (FEET) = 24.49  
 FLOW VELOCITY (FEET/SEC.) = 5.80 DEPTH\*VELOCITY (FT\*FT/SEC.) = 3.48  
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 113.00 = 1236.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 113.00 TO NODE 114.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 585.00 DOWNSTREAM (FEET) = 565.00  
 FLOW LENGTH (FEET) = 702.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.1 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 15.25  
 ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 64.36  
 PIPE TRAVEL TIME (MIN.) = 0.77 Tc (MIN.) = 8.75  
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 114.00 = 1938.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 8.75  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.491

A-13

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.60	0.25	0.100	86
PUBLIC PARK	C	0.20	0.25	0.850	86
RESIDENTIAL ".4 DWELLING/ACRE"	C	1.10	0.25	0.900	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455  
 SUBAREA AREA (ACRES) = 2.90 SUBAREA RUNOFF (CFS) = 11.42  
 EFFECTIVE AREA (ACRES) = 18.30 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.41  
 TOTAL AREA (ACRES) = 18.3 PEAK FLOW RATE (CFS) = 72.42

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 8.75  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.491

A-14

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	9.00	0.25	0.100	86
PUBLIC PARK	C	1.90	0.25	0.850	86
RESIDENTIAL ".4 DWELLING/ACRE"	C	2.70	0.25	0.900	86
COMMERCIAL	D	4.10	0.20	0.100	91
RESIDENTIAL ".4 DWELLING/ACRE"	D	0.30	0.20	0.900	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313  
 SUBAREA AREA (ACRES) = 18.00 SUBAREA RUNOFF (CFS) = 71.52  
 EFFECTIVE AREA (ACRES) = 36.30 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA (ACRES) = 36.3 PEAK FLOW RATE (CFS) = 143.94

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 8.75  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.491

A-15

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	4.50	0.25	0.100	86
PUBLIC PARK	C	1.20	0.25	0.850	86
RESIDENTIAL ".4 DWELLING/ACRE"	C	3.80	0.25	0.900	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.515  
 SUBAREA AREA (ACRES) = 9.50 SUBAREA RUNOFF (CFS) = 37.30  
 EFFECTIVE AREA (ACRES) = 45.80 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.39  
 TOTAL AREA (ACRES) = 45.8 PEAK FLOW RATE (CFS) = 181.24

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 8.75  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.491

OA-3

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	C	5.30	0.25	1.000	92
NATURAL FAIR COVER "WOODLAND, GRASS"	C	0.30	0.25	1.000	92

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 21.38  
 EFFECTIVE AREA (ACRES) = 51.40 AREA-AVERAGED Fm (INCH/HR) = 0.11  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA (ACRES) = 51.4 PEAK FLOW RATE (CFS) = 202.62

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*****
FLOW PROCESS FROM NODE 114.00 TO NODE 115.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 565.00 DOWNSTREAM(FEET) = 535.00
FLOW LENGTH(FEET) = 1017.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.97
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 202.62
PIPE TRAVEL TIME(MIN.) = 0.81 Tc(MIN.) = 9.55
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 115.00 = 2955.00 FEET.

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*****
FLOW PROCESS FROM NODE 115.00 TO NODE 115.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 9.55
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.269
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B         3.40   0.30  0.100  76
COMMERCIAL          C         11.00   0.25  0.100  86
PUBLIC PARK         C         1.80   0.25  0.850  86
RESIDENTIAL
".4 DWELLING/ACRE" C         1.50   0.25  0.900  86
COMMERCIAL          D         3.20   0.20  0.100  91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.222
SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 79.26
EFFECTIVE AREA(ACRES) = 72.30 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 72.3 PEAK FLOW RATE(CFS) = 271.61

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*****
FLOW PROCESS FROM NODE 115.00 TO NODE 108.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----

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ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 480.00
FLOW LENGTH(FEET) = 1110.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.30
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 271.61
PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 10.23
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 108.00 = 4065.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

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=====
MAINLINE Tc(MIN.) = 10.23
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.105
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B         3.10   0.30  0.100  76
PUBLIC PARK         B         1.40   0.30  0.850  76
RESIDENTIAL
".4 DWELLING/ACRE" B         1.10   0.30  0.900  76
COMMERCIAL          C         5.10   0.25  0.100  86
PUBLIC PARK         C         1.90   0.25  0.850  86
RESIDENTIAL
".4 DWELLING/ACRE" C         3.60   0.25  0.900  86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.485
SUBAREA AREA(ACRES) = 16.20 SUBAREA RUNOFF(CFS) = 57.97
EFFECTIVE AREA(ACRES) = 88.50 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 88.5 PEAK FLOW RATE(CFS) = 318.89

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A-17

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*****
FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

MAINLINE Tc(MIN.) = 10.23
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.105
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          D         2.70   0.20  0.100  91
PUBLIC PARK         D         0.10   0.20  0.850  91
RESIDENTIAL
".4 DWELLING/ACRE" D         0.50   0.20  0.900  91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 12.05
EFFECTIVE AREA(ACRES) = 91.80 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 91.8 PEAK FLOW RATE(CFS) = 330.93

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A-17

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*****
FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
-----

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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.23
RAINFALL INTENSITY(INCH/HR) = 4.10
AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.25
AREA-AVERAGED Ap = 0.40
EFFECTIVE STREAM AREA(ACRES) = 91.80
TOTAL STREAM AREA(ACRES) = 91.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 330.93

```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	356.16	16.89	3.080	0.25( 0.05)	0.22	130.8	100.00
2	330.93	10.23	4.105	0.25( 0.10)	0.40	91.8	110.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	619.77	10.23	4.105	0.25( 0.08)	0.32	171.0	110.00
2	602.43	16.89	3.080	0.25( 0.07)	0.29	222.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 619.77 Tc(MIN.) = 10.23  
EFFECTIVE AREA(ACRES) = 171.04 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 222.6  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 108.00 = 5471.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 108.00 TO NODE 128.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 480.00 DOWNSTREAM(FEET) = 473.00  
FLOW LENGTH(FEET) = 900.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 90.0 INCH PIPE IS 71.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.56  
ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 619.77  
PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 11.14  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 128.00 = 6371.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 11.14  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.910

A-19

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.10	0.30	0.100	76
COMMERCIAL	C	3.60	0.25	0.100	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 16.43  
EFFECTIVE AREA(ACRES) = 175.74 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.31  
TOTAL AREA(ACRES) = 227.3 PEAK FLOW RATE(CFS) = 619.77

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 11.14  
RAINFALL INTENSITY(INCH/HR) = 3.91  
AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.25  
AREA-AVERAGED Ap = 0.31  
EFFECTIVE STREAM AREA(ACRES) = 175.74  
TOTAL STREAM AREA(ACRES) = 227.30  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 619.77

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

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 329.00  
ELEVATION DATA: UPSTREAM(FEET) = 640.00 DOWNSTREAM(FEET) = 634.00

Tc = K\*[ (LENGTH\*\* 3.00) / (ELEVATION CHANGE) ]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.880  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.153  
SUBAREA Tc AND LOSS RATE DATA(AMC III):

A-20

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.50	0.25	0.100	86	6.88
PUBLIC PARK	C	0.20	0.25	0.850	86	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	2.70	0.25	0.200	86	7.33
RESIDENTIAL						
".4 DWELLING/ACRE"	C	1.40	0.25	0.900	86	11.02
PUBLIC PARK	D	0.10	0.20	0.850	91	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	D	1.30	0.20	0.200	91	7.33

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.381  
SUBAREA RUNOFF(CFS) = 28.24  
TOTAL AREA(ACRES) = 6.20 PEAK FLOW RATE(CFS) = 28.24

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FLOW PROCESS FROM NODE 121.00 TO NODE 121.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 6.88  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.153

A-20

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.20	0.20	0.900	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900  
 SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF (CFS) = 0.90  
 EFFECTIVE AREA (ACRES) = 6.40 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA (ACRES) = 6.4 PEAK FLOW RATE (CFS) = 29.13

\*\*\*\*\*

FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 634.00 DOWNSTREAM (FEET) = 626.00  
 FLOW LENGTH (FEET) = 425.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.4 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 10.69  
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 29.13  
 PIPE TRAVEL TIME (MIN.) = 0.66 Tc (MIN.) = 7.54  
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 754.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 7.54  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.889

A-21

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	5.40	0.25	0.200	86
RESIDENTIAL					
".4 DWELLING/ACRE"	C	2.40	0.25	0.900	86
COMMERCIAL	C	0.70	0.25	0.100	86
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.60	0.20	0.900	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.423  
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 39.20  
 EFFECTIVE AREA (ACRES) = 15.50 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.41  
 TOTAL AREA (ACRES) = 15.5 PEAK FLOW RATE (CFS) = 66.81

\*\*\*\*\*

FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 626.00 DOWNSTREAM (FEET) = 606.00  
 FLOW LENGTH (FEET) = 1030.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.8 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 13.40  
 ESTIMATED PIPE DIAMETER (INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 66.81  
 PIPE TRAVEL TIME (MIN.) = 1.28 Tc (MIN.) = 8.82

LONGEST FLOWPATH FROM NODE 120.00 TO NODE 123.00 = 1784.00 FEET.

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FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 8.82  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.468

A-22

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	C	7.60	0.25	0.200	86
COMMERCIAL	C	1.40	0.25	0.100	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	2.30	0.25	0.200	86
RESIDENTIAL					
".4 DWELLING/ACRE"	C	6.50	0.25	0.900	86
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	8.40	0.25	0.600	86
APARTMENTS	D	0.50	0.20	0.200	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.491  
 SUBAREA AREA (ACRES) = 26.70 SUBAREA RUNOFF (CFS) = 104.43  
 EFFECTIVE AREA (ACRES) = 42.20 AREA-AVERAGED Fm (INCH/HR) = 0.11  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA (ACRES) = 42.2 PEAK FLOW RATE (CFS) = 165.37

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FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 8.82  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.468

A-22

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.30	0.20	0.100	91
PUBLIC PARK	D	1.10	0.20	0.850	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	2.00	0.20	0.200	91
RESIDENTIAL					
".4 DWELLING/ACRE"	D	3.80	0.20	0.900	91
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	3.80	0.20	0.600	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.642  
 SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF (CFS) = 42.97  
 EFFECTIVE AREA (ACRES) = 53.20 AREA-AVERAGED Fm (INCH/HR) = 0.12  
 AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA (ACRES) = 53.2 PEAK FLOW RATE (CFS) = 208.34

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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)<<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 606.00 DOWNSTREAM(FEET) = 604.00
FLOW LENGTH(FEET) = 222.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.49
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 208.34
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 9.10
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 124.00 = 2006.00 FEET.

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FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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MAINLINE Tc(MIN.) = 9.10
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.391
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS C 0.10 0.25 0.200 86
COMMERCIAL C 1.60 0.25 0.100 86
PUBLIC PARK C 0.20 0.25 0.850 86
APARTMENTS D 0.30 0.20 0.200 91
COMMERCIAL D 2.10 0.20 0.100 91
PUBLIC PARK D 0.60 0.20 0.850 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.231
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 19.14
EFFECTIVE AREA(ACRES) = 58.10 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 58.1 PEAK FLOW RATE(CFS) = 223.77

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**A-23**

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*****
FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 9.10
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.391
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.20 0.20 0.200 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.78
EFFECTIVE AREA(ACRES) = 58.30 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 58.3 PEAK FLOW RATE(CFS) = 224.55

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**A-23**

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FLOW PROCESS FROM NODE 124.00 TO NODE 125.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 604.00 DOWNSTREAM(FEET) = 546.00
FLOW LENGTH(FEET) = 1271.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.16
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 224.55
PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 9.94
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 125.00 = 3277.00 FEET.

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FLOW PROCESS FROM NODE 125.00 TO NODE 125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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MAINLINE Tc(MIN.) = 9.94
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.174
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS C 0.50 0.25 0.200 86
COMMERCIAL C 1.20 0.25 0.100 86
RESIDENTIAL
".4 DWELLING/ACRE" C 1.20 0.25 0.900 86
APARTMENTS D 0.10 0.20 0.200 91
COMMERCIAL D 1.60 0.20 0.100 91
RESIDENTIAL
".4 DWELLING/ACRE" D 3.00 0.20 0.900 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.550
SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 27.74
EFFECTIVE AREA(ACRES) = 65.90 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 65.9 PEAK FLOW RATE(CFS) = 240.90

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**A-25**

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FLOW PROCESS FROM NODE 125.00 TO NODE 125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 9.94
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.174
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS C 1.90 0.25 0.200 86
RESIDENTIAL
".4 DWELLING/ACRE" C 0.60 0.25 0.900 86
RESIDENTIAL
"3-4 DWELLINGS/ACRE" C 0.30 0.25 0.600 86
APARTMENTS D 5.00 0.20 0.200 91
PUBLIC PARK D 2.30 0.20 0.850 91
RESIDENTIAL
".4 DWELLING/ACRE" D 3.50 0.20 0.900 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 49.74
EFFECTIVE AREA(ACRES) = 79.50 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.49

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**A-25.1**

TOTAL AREA (ACRES) = 79.5 PEAK FLOW RATE (CFS) = 290.63

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FLOW PROCESS FROM NODE 125.00 TO NODE 125.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 9.94

\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.174

A-25.1

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	10.20	0.20	0.600	91

RESIDENTIAL

"3-4 DWELLINGS/ACRE" D 10.20 0.20 0.600 91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600

SUBAREA AREA (ACRES) = 10.20 SUBAREA RUNOFF (CFS) = 37.21

EFFECTIVE AREA (ACRES) = 89.70 AREA-AVERAGED Fm (INCH/HR) = 0.11

AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.50

TOTAL AREA (ACRES) = 89.7 PEAK FLOW RATE (CFS) = 327.85

\*\*\*\*\*

FLOW PROCESS FROM NODE 125.00 TO NODE 126.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 546.00 DOWNSTREAM (FEET) = 525.00

FLOW LENGTH (FEET) = 562.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.4 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 25.69

ESTIMATED PIPE DIAMETER (INCH) = 54.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 327.85

PIPE TRAVEL TIME (MIN.) = 0.36 Tc (MIN.) = 10.30

LONGEST FLOWPATH FROM NODE 120.00 TO NODE 126.00 = 3839.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 126.00 TO NODE 126.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 10.30

\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.088

A-26

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	C	5.90	0.25	0.200	86
COMMERCIAL	C	0.10	0.25	0.100	86
RESIDENTIAL					
" .4 DWELLING/ACRE"	C	0.60	0.25	0.900	86
APARTMENTS	D	6.00	0.20	0.200	91
COMMERCIAL	D	1.10	0.20	0.100	91
RESIDENTIAL					
" .4 DWELLING/ACRE"	D	4.70	0.20	0.900	91

APARTMENTS

COMMERCIAL C 0.10 0.25 0.100 86

RESIDENTIAL

" .4 DWELLING/ACRE" C 0.60 0.25 0.900 86

APARTMENTS D 6.00 0.20 0.200 91

COMMERCIAL D 1.10 0.20 0.100 91

RESIDENTIAL

" .4 DWELLING/ACRE" D 4.70 0.20 0.900 91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.21

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.395

SUBAREA AREA (ACRES) = 18.40 SUBAREA RUNOFF (CFS) = 66.32

EFFECTIVE AREA (ACRES) = 108.10 AREA-AVERAGED Fm (INCH/HR) = 0.11

AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.49

TOTAL AREA (ACRES) = 108.1 PEAK FLOW RATE (CFS) = 387.28

\*\*\*\*\*

FLOW PROCESS FROM NODE 126.00 TO NODE 127.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 525.00 DOWNSTREAM (FEET) = 514.00

FLOW LENGTH (FEET) = 607.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 66.0 INCH PIPE IS 49.1 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 20.44

ESTIMATED PIPE DIAMETER (INCH) = 66.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 387.28

PIPE TRAVEL TIME (MIN.) = 0.50 Tc (MIN.) = 10.80

LONGEST FLOWPATH FROM NODE 120.00 TO NODE 127.00 = 4446.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 10.80

\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.980

A-27

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.50	0.30	0.100	76
PUBLIC PARK	B	0.20	0.30	0.850	76
APARTMENTS	C	1.10	0.25	0.200	86
COMMERCIAL	C	12.70	0.25	0.100	86
PUBLIC PARK	C	0.80	0.25	0.850	86
RESIDENTIAL					
" .4 DWELLING/ACRE"	C	4.10	0.25	0.900	86

COMMERCIAL B 1.50 0.30 0.100 76

PUBLIC PARK B 0.20 0.30 0.850 76

APARTMENTS C 1.10 0.25 0.200 86

COMMERCIAL C 12.70 0.25 0.100 86

PUBLIC PARK C 0.80 0.25 0.850 86

RESIDENTIAL

" .4 DWELLING/ACRE" C 4.10 0.25 0.900 86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303

SUBAREA AREA (ACRES) = 20.40 SUBAREA RUNOFF (CFS) = 71.67

EFFECTIVE AREA (ACRES) = 128.50 AREA-AVERAGED Fm (INCH/HR) = 0.10

AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.46

TOTAL AREA (ACRES) = 128.5 PEAK FLOW RATE (CFS) = 448.40

\*\*\*\*\*

FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 10.80

\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.980

A-27

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.20	0.20	0.100	91
PUBLIC PARK	D	1.50	0.20	0.850	91
RESIDENTIAL					
" .4 DWELLING/ACRE"	D	0.10	0.20	0.900	91

COMMERCIAL D 1.20 0.20 0.100 91

PUBLIC PARK D 1.50 0.20 0.850 91

RESIDENTIAL

" .4 DWELLING/ACRE" D 0.10 0.20 0.900 91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530

SUBAREA AREA (ACRES) = 2.80 SUBAREA RUNOFF (CFS) = 9.76  
 EFFECTIVE AREA (ACRES) = 131.30 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA (ACRES) = 131.3 PEAK FLOW RATE (CFS) = 458.16

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 10.80  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.980 **A-28**  
 SUBAREA LOSS RATE DATA (AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL B 1.00 0.30 0.100 76  
 COMMERCIAL C 1.30 0.25 0.100 86  
 COMMERCIAL D 12.60 0.20 0.100 91  
 PUBLIC PARK D 1.10 0.20 0.850 91  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" D 0.10 0.20 0.200 91  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" D 2.10 0.20 0.900 91  
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.20  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.238  
 SUBAREA AREA (ACRES) = 18.20 SUBAREA RUNOFF (CFS) = 64.40  
 EFFECTIVE AREA (ACRES) = 149.50 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA (ACRES) = 149.5 PEAK FLOW RATE (CFS) = 522.55

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 127.00 TO NODE 128.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM (FEET) = 514.00 DOWNSTREAM (FEET) = 473.00  
 FLOW LENGTH (FEET) = 741.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.5 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 33.49  
 ESTIMATED PIPE DIAMETER (INCH) = 60.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 522.55  
 PIPE TRAVEL TIME (MIN.) = 0.37 Tc (MIN.) = 11.17  
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 128.00 = 5187.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 11.17  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.904 **A-29**  
 SUBAREA LOSS RATE DATA (AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 2.20 0.25 0.100 86  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" C 0.40 0.25 0.900 86

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.223  
 SUBAREA AREA (ACRES) = 2.60 SUBAREA RUNOFF (CFS) = 9.01  
 EFFECTIVE AREA (ACRES) = 152.10 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.43  
 TOTAL AREA (ACRES) = 152.1 PEAK FLOW RATE (CFS) = 522.55  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 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.) = 11.17  
 RAINFALL INTENSITY (INCH/HR) = 3.90  
 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.22  
 AREA-AVERAGED Ap = 0.43  
 EFFECTIVE STREAM AREA (ACRES) = 152.10  
 TOTAL STREAM AREA (ACRES) = 152.10  
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 522.55

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	619.77	11.14	3.910	0.25 ( 0.08)	0.31	175.7	110.00
1	602.43	17.80	2.989	0.25 ( 0.07)	0.29	227.3	100.00
2	522.55	11.17	3.904	0.22 ( 0.10)	0.43	152.1	120.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1141.73	11.14	3.910	0.24 ( 0.09)	0.36	327.4	110.00
2	1142.24	11.17	3.904	0.24 ( 0.09)	0.36	328.1	120.00
3	999.45	17.80	2.989	0.24 ( 0.08)	0.34	379.4	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE (CFS) = 1142.24 Tc (MIN.) = 11.17  
 EFFECTIVE AREA (ACRES) = 328.07 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA (ACRES) = 379.4  
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 128.00 = 6371.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 128.00 TO NODE 129.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM (FEET) = 473.00 DOWNSTREAM (FEET) = 455.00  
 FLOW LENGTH (FEET) = 1494.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 108.0 INCH PIPE IS 78.5 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 23.05  
 ESTIMATED PIPE DIAMETER (INCH) = 108.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 1142.24  
 PIPE TRAVEL TIME (MIN.) = 1.08 Tc (MIN.) = 12.25  
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 129.00 = 7865.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 12.25  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.703 **A-30**  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.60	0.30	0.100	76
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.60	0.30	0.900	76
COMMERCIAL	C	1.80	0.25	0.100	86
RESIDENTIAL					
"4 DWELLING/ACRE"	C	1.40	0.25	0.900	86
COMMERCIAL	D	0.80	0.20	0.100	91
RESIDENTIAL					
"4 DWELLING/ACRE"	D	1.60	0.20	0.900	91

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.524  
 SUBAREA AREA (ACRES) = 6.80 SUBAREA RUNOFF (CFS) = 21.90  
 EFFECTIVE AREA (ACRES) = 334.87 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA (ACRES) = 386.2 PEAK FLOW RATE (CFS) = 1142.24  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 12.25  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.703 **A-31**  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.50	0.30	0.100	76
PUBLIC PARK	B	0.30	0.30	0.850	76
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	76
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.10	0.30	0.900	76
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	76
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.20	0.30	0.500	76

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.344  
 SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 15.23  
 EFFECTIVE AREA (ACRES) = 339.57 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.37

TOTAL AREA (ACRES) = 390.9 PEAK FLOW RATE (CFS) = 1142.24  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 12.25  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.703 **A-31**  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.90	0.30	0.400	76
COMMERCIAL	C	4.70	0.25	0.100	86
PUBLIC PARK	C	1.30	0.25	0.850	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.90	0.25	0.200	86
RESIDENTIAL					
"4 DWELLING/ACRE"	C	0.10	0.25	0.900	86
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	3.80	0.25	0.600	86

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.26  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.386  
 SUBAREA AREA (ACRES) = 13.70 SUBAREA RUNOFF (CFS) = 44.42  
 EFFECTIVE AREA (ACRES) = 353.27 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA (ACRES) = 404.6 PEAK FLOW RATE (CFS) = 1149.59

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 12.25  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.703 **A-31**  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	4.40	0.25	0.500	86
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	0.70	0.25	0.400	86
COMMERCIAL	D	5.00	0.20	0.100	91
PUBLIC PARK	D	0.10	0.20	0.850	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	10.30	0.20	0.200	91
RESIDENTIAL					
"4 DWELLING/ACRE"	D	0.10	0.20	0.900	91

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.22  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.253  
 SUBAREA AREA (ACRES) = 20.60 SUBAREA RUNOFF (CFS) = 67.60  
 EFFECTIVE AREA (ACRES) = 373.87 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA (ACRES) = 425.2 PEAK FLOW RATE (CFS) = 1217.19

\*\*\*\*\*

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 12.25  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.703 **A-31**

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	1.30	0.20	0.600	91
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	D	3.90	0.20	0.500	91
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	2.30	0.20	0.400	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.487  
SUBAREA AREA(ACRES) = 7.50 SUBAREA RUNOFF(CFS) = 24.34  
EFFECTIVE AREA(ACRES) = 381.37 AREA-AVERAGED Fm(INCH/HR) = 0.09  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.36  
TOTAL AREA(ACRES) = 432.7 PEAK FLOW RATE(CFS) = 1241.53

\*\*\*\*\*  
FLOW PROCESS FROM NODE 129.00 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) = 455.00 DOWNSTREAM(FEET) = 410.00  
FLOW LENGTH(FEET) = 1786.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 93.0 INCH PIPE IS 74.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.49  
ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 1241.53  
PIPE TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 13.22  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 130.00 = 9651.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.22  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.544 **A-32**

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.30	0.30	0.100	76
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.20	0.30	0.900	76
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	76
COMMERCIAL	C	1.30	0.25	0.100	86
PUBLIC PARK	C	0.10	0.25	0.850	86
RESIDENTIAL					
".4 DWELLING/ACRE"	C	3.00	0.25	0.900	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.598

SUBAREA AREA(ACRES) = 7.00 SUBAREA RUNOFF(CFS) = 21.33  
EFFECTIVE AREA(ACRES) = 388.37 AREA-AVERAGED Fm(INCH/HR) = 0.09  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 439.7 PEAK FLOW RATE(CFS) = 1241.53  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.22  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.544 **A-32**

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	2.50	0.25	0.600	86
COMMERCIAL	D	0.80	0.20	0.100	91
RESIDENTIAL					
".4 DWELLING/ACRE"	D	1.30	0.20	0.900	91
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	3.30	0.20	0.600	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.599  
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 24.28  
EFFECTIVE AREA(ACRES) = 396.27 AREA-AVERAGED Fm(INCH/HR) = 0.09  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 447.6 PEAK FLOW RATE(CFS) = 1241.53  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

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

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

\*\*\*\*\*

FLOW PROCESS FROM NODE 150.00 TO NODE 151.00 IS CODE = 21

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

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00  
ELEVATION DATA: UPSTREAM(FEET) = 765.00 DOWNSTREAM(FEET) = 675.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.312 **OA-4**  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.332

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER						
"OPEN BRUSH"	C	1.50	0.25	1.000	92	9.31
NATURAL FAIR COVER						
"WOODLAND,GRASS"	C	0.40	0.25	1.000	92	9.31

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF(CFS) = 6.98  
TOTAL AREA(ACRES) = 1.90 PEAK FLOW RATE(CFS) = 6.98

\*\*\*\*\*  
FLOW PROCESS FROM NODE 151.00 TO NODE 152.00 IS CODE = 51

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	675.00	DOWNSTREAM(FEET) =	635.00
CHANNEL LENGTH THRU SUBAREA(FEET) =	421.00	CHANNEL SLOPE =	0.0950
CHANNEL BASE(FEET) =	0.00	"Z" FACTOR =	3.000
MANNING'S FACTOR =	0.040	MAXIMUM DEPTH(FEET) =	20.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =	4.082		

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SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	C	4.90	0.25	1.000	92
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	2.40	0.25	1.000	92
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.58					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.88					
AVERAGE FLOW DEPTH(FEET) = 0.97 TRAVEL TIME(MIN.) = 1.02					
Tc(MIN.) = 10.33					
SUBAREA AREA(ACRES) = 7.30 SUBAREA RUNOFF(CFS) = 25.18					
EFFECTIVE AREA(ACRES) = 9.20 AREA-AVERAGED Fm(INCH/HR) = 0.25					
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00					
TOTAL AREA(ACRES) = 9.2 PEAK FLOW RATE(CFS) = 31.73					

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 1.17 FLOW VELOCITY(FEET/SEC.) = 7.72  
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 152.00 = 751.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 152.00 TO NODE 153.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	635.00	DOWNSTREAM(FEET) =	631.00
FLOW LENGTH(FEET) =	501.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	30.0 INCH PIPE IS	22.5 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	8.03		
ESTIMATED PIPE DIAMETER(INCH) =	30.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	31.73		
PIPE TRAVEL TIME(MIN.) =	1.04	Tc(MIN.) =	11.37
LONGEST FLOWPATH FROM NODE	150.00 TO NODE	153.00 =	1252.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) =	11.37
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =	3.864

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	C	5.10	0.25	1.000	92
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	4.00	0.25	1.000	92
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000					
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 29.60					
EFFECTIVE AREA(ACRES) = 18.30 AREA-AVERAGED Fm(INCH/HR) = 0.25					
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00					
TOTAL AREA(ACRES) = 18.3 PEAK FLOW RATE(CFS) = 59.52					

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 153.00 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) =	631.00	DOWNSTREAM(FEET) =	630.00
FLOW LENGTH(FEET) =	711.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	51.0 INCH PIPE IS	41.4 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	4.83		
ESTIMATED PIPE DIAMETER(INCH) =	51.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	59.52		
PIPE TRAVEL TIME(MIN.) =	2.45	Tc(MIN.) =	13.83
LONGEST FLOWPATH FROM NODE	150.00 TO NODE	154.00 =	1963.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) =	13.83
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =	3.454

OA-7

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	0.30	0.25	1.000	91
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	C	5.70	0.25	1.000	95
NATURAL FAIR COVER					
"OPEN BRUSH"	C	3.40	0.25	1.000	92
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	0.10	0.25	1.000	92
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	D	2.10	0.20	1.000	97
NATURAL FAIR COVER					
"OPEN BRUSH"	D	1.60	0.20	1.000	96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000					
SUBAREA AREA(ACRES) = 13.20 SUBAREA RUNOFF(CFS) = 38.24					
EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.24					
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 1.00					
TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 91.01					

```
*****
FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.83
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.454
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA      Fp        Ap    SCS
LAND USE             GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"WOODLAND,GRASS"    D         0.20    0.20    1.000    95
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 0.20    SUBAREA RUNOFF(CFS) = 0.59
EFFECTIVE AREA(ACRES) = 31.70    AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.24    AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.7    PEAK FLOW RATE(CFS) = 91.60

```

OA-7

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*****
FLOW PROCESS FROM NODE 154.00 TO NODE 155.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 630.00 DOWNSTREAM(FEET) = 628.00
FLOW LENGTH(FEET) = 910.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.46
ESTIMATED PIPE DIAMETER(INCH) = 57.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 91.60
PIPE TRAVEL TIME(MIN.) = 2.35    Tc(MIN.) = 16.18
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 155.00 = 2873.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

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```
MAINLINE Tc(MIN.) = 16.18
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.157
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA      Fp        Ap    SCS
LAND USE             GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" C         1.60    0.25    1.000    91
NATURAL FAIR COVER
"OPEN BRUSH"         C         1.60    0.25    1.000    92
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" D         1.80    0.20    1.000    95
NATURAL FAIR COVER
"OPEN BRUSH"         D         1.50    0.20    1.000    96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 6.50    SUBAREA RUNOFF(CFS) = 17.16
EFFECTIVE AREA(ACRES) = 38.20    AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.24    AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 38.2    PEAK FLOW RATE(CFS) = 100.28

```

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```
*****
FLOW PROCESS FROM NODE 155.00 TO NODE 156.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 629.00 DOWNSTREAM(FEET) = 610.00
FLOW LENGTH(FEET) = 796.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.31
ESTIMATED PIPE DIAMETER(INCH) = 39.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 100.28
PIPE TRAVEL TIME(MIN.) = 0.81    Tc(MIN.) = 16.99
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 156.00 = 3669.00 FEET.

```

```
*****
FLOW PROCESS FROM NODE 156.00 TO NODE 156.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

```

```
MAINLINE Tc(MIN.) = 16.99
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.070
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA      Fp        Ap    SCS
LAND USE             GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" C         1.90    0.25    1.000    91
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" C         0.40    0.25    1.000    95
NATURAL FAIR COVER
"OPEN BRUSH"         C         1.30    0.25    1.000    92
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" D         4.50    0.20    1.000    95
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" D         1.30    0.20    1.000    97
NATURAL FAIR COVER
"OPEN BRUSH"         D         3.70    0.20    1.000    96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 13.10    SUBAREA RUNOFF(CFS) = 33.67
EFFECTIVE AREA(ACRES) = 51.30    AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.23    AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 51.3    PEAK FLOW RATE(CFS) = 130.95

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*****
FLOW PROCESS FROM NODE 156.00 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) = 610.00 DOWNSTREAM(FEET) = 410.00
FLOW LENGTH(FEET) = 6198.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.27
ESTIMATED PIPE DIAMETER(INCH) = 39.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 130.95
PIPE TRAVEL TIME(MIN.) = 5.36    Tc(MIN.) = 22.35

```

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 130.00 = 9867.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 11

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

\*\* MAIN STREAM CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	130.95	22.35	2.623	0.23( 0.23)	1.00	51.3	150.00

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 130.00 = 9867.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1241.22	13.19	3.548	0.24( 0.09)	0.37	395.6	110.00
2	1241.53	13.22	3.544	0.24( 0.09)	0.37	396.3	120.00
3	1095.09	19.92	2.803	0.24( 0.08)	0.36	447.6	100.00

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 130.00 = 9651.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1348.44	13.19	3.548	0.24( 0.10)	0.42	425.9	110.00
2	1348.84	13.22	3.544	0.24( 0.10)	0.42	426.6	120.00
3	1220.52	19.92	2.803	0.24( 0.10)	0.42	493.3	100.00
4	1153.86	22.35	2.623	0.24( 0.10)	0.42	498.9	150.00

TOTAL AREA (ACRES) = 498.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1348.84 Tc(MIN.) = 13.224  
EFFECTIVE AREA(ACRES) = 426.63 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.42  
TOTAL AREA(ACRES) = 498.9  
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 130.00 = 9867.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 13.22

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.544

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SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
AGRICULTURAL POOR COVER "FALLOW"	B	1.60	0.30	1.000	97
NATURAL FAIR COVER "OPEN BRUSH"	B	1.30	0.30	1.000	84
RESIDENTIAL ".4 DWELLING/ACRE"	B	2.60	0.30	0.900	76
NATURAL FAIR COVER "WOODLAND,GRASS"	B	1.90	0.30	1.000	83
AGRICULTURAL POOR COVER "FALLOW"	C	0.70	0.25	1.000	98

NATURAL FAIR COVER

"OPEN BRUSH" C 0.80 0.25 1.000 92  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.29  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.971  
SUBAREA AREA(ACRES) = 8.90 SUBAREA RUNOFF(CFS) = 26.12  
EFFECTIVE AREA(ACRES) = 435.53 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.43  
TOTAL AREA(ACRES) = 507.8 PEAK FLOW RATE(CFS) = 1349.04

\*\*\*\*\*

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 13.22

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.544

A-33

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	C	0.10	0.25	0.850	86
RESIDENTIAL ".4 DWELLING/ACRE"	C	1.50	0.25	0.900	86
NATURAL FAIR COVER "WOODLAND,GRASS"	C	0.40	0.25	1.000	92
NATURAL FAIR COVER "OPEN BRUSH"	D	0.10	0.20	1.000	96
RESIDENTIAL ".4 DWELLING/ACRE"	D	0.30	0.20	0.900	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.919  
SUBAREA AREA(ACRES) = 2.40 SUBAREA RUNOFF(CFS) = 7.18  
EFFECTIVE AREA(ACRES) = 437.93 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.43  
TOTAL AREA(ACRES) = 510.2 PEAK FLOW RATE(CFS) = 1356.21

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 510.2 TC(MIN.) = 13.22  
EFFECTIVE AREA(ACRES) = 437.93 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.432  
PEAK FLOW RATE(CFS) = 1356.21

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1355.82	13.19	3.548	0.24( 0.10)	0.43	437.2	110.00
2	1356.21	13.22	3.544	0.24( 0.10)	0.43	437.9	120.00
3	1226.53	19.92	2.803	0.24( 0.10)	0.43	504.6	100.00
4	1157.19	22.35	2.623	0.24( 0.10)	0.43	510.2	150.00

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
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Ver. 20.0 Release Date: 06/01/2013 License ID 1264

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*

\* RMV PA-3 SUBAREA A ROMP 2018 \*  
\* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
\* 25-YR HC AUGUST 2018 ROKAMOTO \*  
\*\*\*\*\*

FILE NAME: PA3A25HC.DAT  
TIME/DATE OF STUDY: 10:40 08/14/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*DATA BANK RAINFALL USED\*  
\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP (FT)	MANNING HIKE (FT)	FACTOR (n)	
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
2	32.0	27.0	0.020/0.020/ ---	0.67	2.00	0.0312	0.167	0.0150
3	13.0	8.0	0.020/0.020/ ---	0.33	1.00	0.0312	0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 327.00  
ELEVATION DATA: UPSTREAM(FEET) = 725.00 DOWNSTREAM(FEET) = 642.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.413

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.372

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "OPEN BRUSH"	C	1.10	0.25	1.000	77	9.41

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA RUNOFF(CFS) = 3.09  
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 3.09

OA-1

\*\*\*\*\*

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 51

-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 642.00 DOWNSTREAM(FEET) = 605.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 385.00 CHANNEL SLOPE = 0.0961  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.160

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SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	C	0.90	0.25	1.000	75
NATURAL FAIR COVER "OPEN BRUSH"	C	2.60	0.25	1.000	77
RESIDENTIAL ".4 DWELLING/ACRE"	C	0.70	0.25	0.900	69

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.983  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.60  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.62  
AVERAGE FLOW DEPTH(FEET) = 0.71 TRAVEL TIME(MIN.) = 1.14  
Tc(MIN.) = 10.55  
SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 11.02  
EFFECTIVE AREA(ACRES) = 5.30 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.99  
TOTAL AREA(ACRES) = 5.3 PEAK FLOW RATE(CFS) = 13.90

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.86 FLOW VELOCITY(FEET/SEC.) = 6.30  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 712.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 62

-----

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

=====

UPSTREAM ELEVATION(FEET) = 605.00 DOWNSTREAM ELEVATION(FEET) = 584.00  
STREET LENGTH(FEET) = 264.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.66

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.36

HALFSTREET FLOOD WIDTH(FEET) = 11.05

AVERAGE FLOW VELOCITY(FEET/SEC.) = 6.48

PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.33

STREET FLOW TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 11.23

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.051

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	C	1.10	0.25	0.900	69
COMMERCIAL	C	1.00	0.25	0.100	69

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.519

SUBAREA AREA(ACRES) = 2.10 SUBAREA RUNOFF(CFS) = 5.52

EFFECTIVE AREA(ACRES) = 7.40 AREA-AVERAGED Fm(INCH/HR) = 0.21

AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.85

TOTAL AREA(ACRES) = 7.4 PEAK FLOW RATE(CFS) = 18.90

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.68

FLOW VELOCITY(FEET/SEC.) = 6.69 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.48

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 976.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 62

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

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 584.00 DOWNSTREAM ELEVATION(FEET) = 564.00

STREET LENGTH(FEET) = 494.00 CURB HEIGHT(INCHES) = 8.0

STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.018

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 31.17

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.46

HALFSTREET FLOOD WIDTH(FEET) = 16.76

AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.77

PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.66

STREET FLOW TRAVEL TIME(MIN.) = 1.43 Tc(MIN.) = 12.66

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.851

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.10	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
COMMERCIAL	C	6.60	0.25	0.100	69
RESIDENTIAL					
".4 DWELLING/ACRE"	C	1.80	0.25	0.900	69

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.271

SUBAREA AREA(ACRES) = 9.80 SUBAREA RUNOFF(CFS) = 24.53

EFFECTIVE AREA(ACRES) = 17.20 AREA-AVERAGED Fm(INCH/HR) = 0.13

AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.52

TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 42.10

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 18.95

FLOW VELOCITY(FEET/SEC.) = 6.19 DEPTH\*VELOCITY(FT\*FT/SEC.) = 3.10

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 1470.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 104.00 TO NODE 105.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 564.00 DOWNSTREAM(FEET) = 520.00

FLOW LENGTH(FEET) = 1456.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.7 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 14.35

ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 42.10

PIPE TRAVEL TIME(MIN.) = 1.69 Tc(MIN.) = 14.35

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 2926.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 14.35

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.656

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.60	0.30	0.100	56
COMMERCIAL	C	3.90	0.25	0.100	69
PUBLIC PARK	C	0.20	0.25	0.850	69
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.90	0.25	0.900	69

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.255

A-2

A-1

A-3

SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 13.06  
EFFECTIVE AREA (ACRES) = 22.80 AREA-AVERAGED Fm (INCH/HR) = 0.12  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.46  
TOTAL AREA (ACRES) = 22.8 PEAK FLOW RATE (CFS) = 52.13

\*\*\*\*\*  
FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 14.35  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.656 **A-4**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 0.60 0.30 0.100 56  
PUBLIC PARK B 0.30 0.30 0.850 56  
RESIDENTIAL  
".4 DWELLING/ACRE" B 0.40 0.30 0.900 56  
COMMERCIAL C 5.00 0.25 0.100 69  
PUBLIC PARK C 2.10 0.25 0.850 69  
RESIDENTIAL  
".4 DWELLING/ACRE" C 0.80 0.25 0.900 69  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.26  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400  
SUBAREA AREA (ACRES) = 9.20 SUBAREA RUNOFF (CFS) = 21.13  
EFFECTIVE AREA (ACRES) = 32.00 AREA-AVERAGED Fm (INCH/HR) = 0.11  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.44  
TOTAL AREA (ACRES) = 32.0 PEAK FLOW RATE (CFS) = 73.26

\*\*\*\*\*  
FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 14.35  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.656 **A-4**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL D 1.80 0.20 0.100 75  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.20  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 4.27  
EFFECTIVE AREA (ACRES) = 33.80 AREA-AVERAGED Fm (INCH/HR) = 0.11  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.42  
TOTAL AREA (ACRES) = 33.8 PEAK FLOW RATE (CFS) = 77.53

\*\*\*\*\*  
FLOW PROCESS FROM NODE 105.00 TO NODE 106.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 520.00 DOWNSTREAM (FEET) = 503.00  
FLOW LENGTH (FEET) = 804.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.3 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 14.59

ESTIMATED PIPE DIAMETER (INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 77.53  
PIPE TRAVEL TIME (MIN.) = 0.92 Tc (MIN.) = 15.27  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 3730.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 15.27  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.564 **A-5**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 2.80 0.30 0.100 56  
COMMERCIAL C 7.60 0.25 0.100 69  
PUBLIC PARK C 0.40 0.25 0.850 69  
COMMERCIAL D 10.50 0.20 0.100 75  
RESIDENTIAL  
".4 DWELLING/ACRE" D 0.30 0.20 0.900 75  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.125  
SUBAREA AREA (ACRES) = 21.60 SUBAREA RUNOFF (CFS) = 49.29  
EFFECTIVE AREA (ACRES) = 55.40 AREA-AVERAGED Fm (INCH/HR) = 0.08  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.31  
TOTAL AREA (ACRES) = 55.4 PEAK FLOW RATE (CFS) = 124.03

\*\*\*\*\*  
FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 15.27  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.564 **A-6**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 6.80 0.30 0.100 56  
COMMERCIAL C 12.10 0.25 0.100 69  
PUBLIC PARK C 1.00 0.25 0.850 69  
COMMERCIAL D 4.50 0.20 0.100 75  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.131  
SUBAREA AREA (ACRES) = 24.40 SUBAREA RUNOFF (CFS) = 55.58  
EFFECTIVE AREA (ACRES) = 79.80 AREA-AVERAGED Fm (INCH/HR) = 0.06  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.25  
TOTAL AREA (ACRES) = 79.8 PEAK FLOW RATE (CFS) = 179.61

\*\*\*\*\*  
FLOW PROCESS FROM NODE 106.00 TO NODE 107.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 503.00 DOWNSTREAM (FEET) = 485.00  
FLOW LENGTH (FEET) = 808.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.0 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 18.27  
ESTIMATED PIPE DIAMETER (INCH) = 48.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 179.61  
PIPE TRAVEL TIME (MIN.) = 0.74 Tc (MIN.) = 16.01  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 107.00 = 4538.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 16.01  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.497 **A-8**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 3.40 0.30 0.100 56  
COMMERCIAL C 6.70 0.25 0.100 69  
PUBLIC PARK C 0.10 0.25 0.850 69  
COMMERCIAL D 2.50 0.20 0.100 75  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.106  
SUBAREA AREA (ACRES) = 12.70 SUBAREA RUNOFF (CFS) = 28.23  
EFFECTIVE AREA (ACRES) = 92.50 AREA-AVERAGED Fm (INCH/HR) = 0.06  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.23  
TOTAL AREA (ACRES) = 92.5 PEAK FLOW RATE (CFS) = 203.00

\*\*\*\*\*  
FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 16.01  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.497 **A-7**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 7.20 0.30 0.100 56  
PUBLIC PARK B 0.70 0.30 0.850 56  
COMMERCIAL C 7.60 0.25 0.100 69  
PUBLIC PARK C 0.30 0.25 0.850 69  
COMMERCIAL D 4.70 0.20 0.100 75  
PUBLIC PARK D 0.40 0.20 0.850 75  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.26  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.150  
SUBAREA AREA (ACRES) = 20.90 SUBAREA RUNOFF (CFS) = 46.23  
EFFECTIVE AREA (ACRES) = 113.40 AREA-AVERAGED Fm (INCH/HR) = 0.05  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.22  
TOTAL AREA (ACRES) = 113.4 PEAK FLOW RATE (CFS) = 249.23

\*\*\*\*\*  
FLOW PROCESS FROM NODE 107.00 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) = 485.00 DOWNSTREAM (FEET) = 480.00  
FLOW LENGTH (FEET) = 933.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 69.0 INCH PIPE IS 53.6 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 11.51  
ESTIMATED PIPE DIAMETER (INCH) = 69.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 249.23  
PIPE TRAVEL TIME (MIN.) = 1.35 Tc (MIN.) = 17.36  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 108.00 = 5471.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 17.36  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.385 **A-18**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 3.50 0.30 0.100 56  
RESIDENTIAL  
".4 DWELLING/ACRE" B 0.60 0.30 0.900 56  
COMMERCIAL C 2.80 0.25 0.100 69  
RESIDENTIAL  
".4 DWELLING/ACRE" C 0.80 0.25 0.900 69  
COMMERCIAL D 0.60 0.20 0.100 75  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.27  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.235  
SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 17.34  
EFFECTIVE AREA (ACRES) = 121.70 AREA-AVERAGED Fm (INCH/HR) = 0.06  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.22  
TOTAL AREA (ACRES) = 121.7 PEAK FLOW RATE (CFS) = 255.14

\*\*\*\*\*  
FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 17.36  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.385 **A-9**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
APARTMENTS B 0.40 0.30 0.200 56  
APARTMENTS C 5.50 0.25 0.200 69  
APARTMENTS D 3.20 0.20 0.200 75  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 19.15  
EFFECTIVE AREA (ACRES) = 130.80 AREA-AVERAGED Fm (INCH/HR) = 0.05  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.22  
TOTAL AREA (ACRES) = 130.8 PEAK FLOW RATE (CFS) = 274.29

\*\*\*\*\*  
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.) = 17.36  
 RAINFALL INTENSITY(INCH/HR) = 2.38  
 AREA-AVERAGED Fm(INCH/HR) = 0.05  
 AREA-AVERAGED Fp(INCH/HR) = 0.25  
 AREA-AVERAGED Ap = 0.22  
 EFFECTIVE STREAM AREA(ACRES) = 130.80  
 TOTAL STREAM AREA(ACRES) = 130.80  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 274.29

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00  
 ELEVATION DATA: UPSTREAM(FEET) = 645.00 DOWNSTREAM(FEET) = 625.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
 SUBAREA ANALYSIS USED MINIMUM  $T_c$ (MIN.) = 5.417  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.610

A-10

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
" .4 DWELLING/ACRE"	C	0.40	0.25	0.900	69	8.68
COMMERCIAL	D	0.30	0.20	0.100	75	5.42
PUBLIC PARK	D	1.30	0.20	0.850	75	8.61
RESIDENTIAL						
" .4 DWELLING/ACRE"	D	1.00	0.20	0.900	75	8.68

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.798  
 SUBAREA RUNOFF(CFS) = 12.00  
 TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 12.00

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 62  
 -----

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

UPSTREAM ELEVATION(FEET) = 625.00 DOWNSTREAM ELEVATION(FEET) = 595.00  
 STREET LENGTH(FEET) = 517.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 18.99  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.39  
 HALFSTREET FLOOD WIDTH(FEET) = 12.54

AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.94  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.30  
 STREET FLOW TRAVEL TIME(MIN.) = 1.45 Tc(MIN.) = 6.87  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.031

A-11

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	2.30	0.25	0.100	69
RESIDENTIAL					
" .4 DWELLING/ACRE"	C	0.30	0.25	0.900	69
COMMERCIAL	D	1.00	0.20	0.100	75
RESIDENTIAL					
" .4 DWELLING/ACRE"	D	0.30	0.20	0.900	75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.223  
 SUBAREA AREA(ACRES) = 3.90 SUBAREA RUNOFF(CFS) = 13.97  
 EFFECTIVE AREA(ACRES) = 6.90 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.47  
 TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 24.40

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 14.02  
 FLOW VELOCITY(FEET/SEC.) = 6.26 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.58  
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 112.00 = 847.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 112.00 TO NODE 113.00 IS CODE = 62  
 -----

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

UPSTREAM ELEVATION(FEET) = 595.00 DOWNSTREAM ELEVATION(FEET) = 585.00  
 STREET LENGTH(FEET) = 389.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 38.11

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.52  
 HALFSTREET FLOOD WIDTH(FEET) = 19.88  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.12  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.65  
 STREET FLOW TRAVEL TIME(MIN.) = 1.27 Tc(MIN.) = 8.13  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.662

A-12

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	5.00	0.25	0.100	69
RESIDENTIAL					
" .4 DWELLING/ACRE"	C	2.20	0.25	0.900	69

COMMERCIAL D 1.00 0.20 0.100 75  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" D 0.30 0.20 0.900 75  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335  
 SUBAREA AREA (ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 27.39  
 EFFECTIVE AREA(ACRES) = 15.40 AREA-AVERAGED Fm(INCH/HR) = 0.09  
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA(ACRES) = 15.4 PEAK FLOW RATE(CFS) = 49.51

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH( FEET) = 0.56 HALFSTREET FLOOD WIDTH( FEET) = 22.07  
 FLOW VELOCITY( FEET/SEC.) = 5.45 DEPTH\*VELOCITY( FT\*FT/SEC.) = 3.03  
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 113.00 = 1236.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 113.00 TO NODE 114.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM( FEET) = 585.00 DOWNSTREAM( FEET) = 565.00  
 FLOW LENGTH( FEET) = 702.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 22.1 INCHES  
 PIPE-FLOW VELOCITY( FEET/SEC.) = 14.22  
 ESTIMATED PIPE DIAMETER( INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW( CFS) = 49.51  
 PIPE TRAVEL TIME( MIN.) = 0.82 Tc( MIN.) = 8.96  
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 114.00 = 1938.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc( MIN.) = 8.96  
 \* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 3.468  
 SUBAREA LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.60	0.25	0.100	69
PUBLIC PARK	C	0.20	0.25	0.850	69
RESIDENTIAL ".4 DWELLING/ACRE"	C	1.10	0.25	0.900	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455  
 SUBAREA AREA( ACRES) = 2.90 SUBAREA RUNOFF( CFS) = 8.75  
 EFFECTIVE AREA( ACRES) = 18.30 AREA-AVERAGED Fm( INCH/HR) = 0.09  
 AREA-AVERAGED Fp( INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.41  
 TOTAL AREA( ACRES) = 18.3 PEAK FLOW RATE( CFS) = 55.57

A-13

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc( MIN.) = 8.96  
 \* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 3.468

SUBAREA LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	9.00	0.25	0.100	69
PUBLIC PARK	C	1.90	0.25	0.850	69
RESIDENTIAL ".4 DWELLING/ACRE"	C	2.70	0.25	0.900	69
COMMERCIAL	D	4.10	0.20	0.100	75
RESIDENTIAL ".4 DWELLING/ACRE"	D	0.30	0.20	0.900	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313  
 SUBAREA AREA( ACRES) = 18.00 SUBAREA RUNOFF( CFS) = 54.95  
 EFFECTIVE AREA( ACRES) = 36.30 AREA-AVERAGED Fm( INCH/HR) = 0.09  
 AREA-AVERAGED Fp( INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA( ACRES) = 36.3 PEAK FLOW RATE( CFS) = 110.51

A-14

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc( MIN.) = 8.96  
 \* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 3.468  
 SUBAREA LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	4.50	0.25	0.100	69
PUBLIC PARK	C	1.20	0.25	0.850	69
RESIDENTIAL ".4 DWELLING/ACRE"	C	3.80	0.25	0.900	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.515  
 SUBAREA AREA( ACRES) = 9.50 SUBAREA RUNOFF( CFS) = 28.55  
 EFFECTIVE AREA( ACRES) = 45.80 AREA-AVERAGED Fm( INCH/HR) = 0.09  
 AREA-AVERAGED Fp( INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.39  
 TOTAL AREA( ACRES) = 45.8 PEAK FLOW RATE( CFS) = 139.06

A-15

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc( MIN.) = 8.96  
 \* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 3.468  
 SUBAREA LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	C	5.30	0.25	1.000	77
NATURAL FAIR COVER "WOODLAND, GRASS"	C	0.30	0.25	1.000	77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp( INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA( ACRES) = 5.60 SUBAREA RUNOFF( CFS) = 16.22  
 EFFECTIVE AREA( ACRES) = 51.40 AREA-AVERAGED Fm( INCH/HR) = 0.11  
 AREA-AVERAGED Fp( INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.46  
 TOTAL AREA( ACRES) = 51.4 PEAK FLOW RATE( CFS) = 155.28

OA-3

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*****
FLOW PROCESS FROM NODE 114.00 TO NODE 115.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 565.00 DOWNSTREAM(FEET) = 535.00
FLOW LENGTH(FEET) = 1017.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.38
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 155.28
PIPE TRAVEL TIME(MIN.) = 0.87 Tc(MIN.) = 9.83
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 115.00 = 2955.00 FEET.

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FLOW PROCESS FROM NODE 115.00 TO NODE 115.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 9.83
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.290
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 3.40 0.30 0.100 56
COMMERCIAL C 11.00 0.25 0.100 69
PUBLIC PARK C 1.80 0.25 0.850 69
RESIDENTIAL
".4 DWELLING/ACRE" C 1.50 0.25 0.900 69
COMMERCIAL D 3.20 0.20 0.100 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.222
SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 60.84
EFFECTIVE AREA(ACRES) = 72.30 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 72.3 PEAK FLOW RATE(CFS) = 207.88

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FLOW PROCESS FROM NODE 115.00 TO NODE 108.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 480.00
FLOW LENGTH(FEET) = 1110.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 33.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.17
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 207.88
PIPE TRAVEL TIME(MIN.) = 0.74 Tc(MIN.) = 10.57
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 108.00 = 4065.00 FEET.

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FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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A-16

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MAINLINE Tc(MIN.) = 10.57
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.158
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 3.10 0.30 0.100 56
PUBLIC PARK B 1.40 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.10 0.30 0.900 56
COMMERCIAL C 5.10 0.25 0.100 69
PUBLIC PARK C 1.90 0.25 0.850 69
RESIDENTIAL
".4 DWELLING/ACRE" C 3.60 0.25 0.900 69
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.27
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.485
SUBAREA AREA(ACRES) = 16.20 SUBAREA RUNOFF(CFS) = 44.17
EFFECTIVE AREA(ACRES) = 88.50 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 88.5 PEAK FLOW RATE(CFS) = 243.49

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FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 10.57
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.158
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL D 2.70 0.20 0.100 75
PUBLIC PARK D 0.10 0.20 0.850 75
RESIDENTIAL
".4 DWELLING/ACRE" D 0.50 0.20 0.900 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 9.24
EFFECTIVE AREA(ACRES) = 91.80 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 91.8 PEAK FLOW RATE(CFS) = 252.72

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FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.57
RAINFALL INTENSITY(INCH/HR) = 3.16
AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.25
AREA-AVERAGED Ap = 0.40
EFFECTIVE STREAM AREA(ACRES) = 91.80
TOTAL STREAM AREA(ACRES) = 91.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 252.72

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A-17

A-17

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	274.29	17.36	2.385	0.25( 0.05)	0.22	130.8	100.00
2	252.72	10.57	3.158	0.25( 0.10)	0.40	91.8	110.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	475.12	10.57	3.158	0.25( 0.08)	0.32	171.4	110.00
2	463.10	17.36	2.385	0.25( 0.07)	0.29	222.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 475.12 Tc(MIN.) = 10.57  
EFFECTIVE AREA(ACRES) = 171.42 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.32  
TOTAL AREA(ACRES) = 222.6  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 108.00 = 5471.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 108.00 TO NODE 128.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 480.00 DOWNSTREAM(FEET) = 473.00  
FLOW LENGTH(FEET) = 900.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 81.0 INCH PIPE IS 64.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.45  
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 475.12  
PIPE TRAVEL TIME(MIN.) = 0.97 Tc(MIN.) = 11.54  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 128.00 = 6371.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 11.54  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.005

A-19

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.10	0.30	0.100	56
COMMERCIAL	C	3.60	0.25	0.100	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 12.60  
EFFECTIVE AREA(ACRES) = 176.12 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.31  
TOTAL AREA(ACRES) = 227.3 PEAK FLOW RATE(CFS) = 475.12  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 11.54  
RAINFALL INTENSITY(INCH/HR) = 3.01  
AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.25  
AREA-AVERAGED Ap = 0.31  
EFFECTIVE STREAM AREA(ACRES) = 176.12  
TOTAL STREAM AREA(ACRES) = 227.30  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 475.12

\*\*\*\*\*

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

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 329.00  
ELEVATION DATA: UPSTREAM(FEET) = 640.00 DOWNSTREAM(FEET) = 634.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.880  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.027  
SUBAREA Tc AND LOSS RATE DATA(AMC II):

A-20

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	C	0.50	0.25	0.100	69	6.88
PUBLIC PARK	C	0.20	0.25	0.850	69	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	2.70	0.25	0.200	69	7.33
RESIDENTIAL						
".4 DWELLING/ACRE"	C	1.40	0.25	0.900	69	11.02
PUBLIC PARK	D	0.10	0.20	0.850	75	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	D	1.30	0.20	0.200	75	7.33

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.381  
SUBAREA RUNOFF(CFS) = 21.95  
TOTAL AREA(ACRES) = 6.20 PEAK FLOW RATE(CFS) = 21.95

\*\*\*\*\*

FLOW PROCESS FROM NODE 121.00 TO NODE 121.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 6.88  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.027

A-20

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.20	0.20	0.900	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900  
SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF (CFS) = 0.69  
EFFECTIVE AREA (ACRES) = 6.40 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.40  
TOTAL AREA (ACRES) = 6.4 PEAK FLOW RATE (CFS) = 22.64

\*\*\*\*\*  
FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 634.00 DOWNSTREAM (FEET) = 626.00  
FLOW LENGTH (FEET) = 425.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.8 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 10.34  
ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 22.64  
PIPE TRAVEL TIME (MIN.) = 0.69 Tc (MIN.) = 7.56  
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 754.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 7.56  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.816

A-21

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	5.40	0.25	0.200	69
RESIDENTIAL					
".4 DWELLING/ACRE"	C	2.40	0.25	0.900	69
COMMERCIAL	C	0.70	0.25	0.100	69
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.60	0.20	0.900	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.423  
SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 30.41  
EFFECTIVE AREA (ACRES) = 15.50 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.41  
TOTAL AREA (ACRES) = 15.5 PEAK FLOW RATE (CFS) = 51.84

\*\*\*\*\*  
FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 626.00 DOWNSTREAM (FEET) = 606.00  
FLOW LENGTH (FEET) = 1030.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.5 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 12.58  
ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 51.84  
PIPE TRAVEL TIME (MIN.) = 1.36 Tc (MIN.) = 8.93

LONGEST FLOWPATH FROM NODE 120.00 TO NODE 123.00 = 1784.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 8.93  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.474

A-22

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	C	7.60	0.25	0.200	69
COMMERCIAL	C	1.40	0.25	0.100	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	2.30	0.25	0.200	69
RESIDENTIAL					
".4 DWELLING/ACRE"	C	6.50	0.25	0.900	69
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	8.40	0.25	0.600	69
APARTMENTS	D	0.50	0.20	0.200	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.491  
SUBAREA AREA (ACRES) = 26.70 SUBAREA RUNOFF (CFS) = 80.53  
EFFECTIVE AREA (ACRES) = 42.20 AREA-AVERAGED Fm (INCH/HR) = 0.11  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.46  
TOTAL AREA (ACRES) = 42.2 PEAK FLOW RATE (CFS) = 127.60

\*\*\*\*\*  
FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 8.93  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.474

A-22

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.30	0.20	0.100	75
PUBLIC PARK	D	1.10	0.20	0.850	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	2.00	0.20	0.200	75
RESIDENTIAL					
".4 DWELLING/ACRE"	D	3.80	0.20	0.900	75
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	3.80	0.20	0.600	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.642  
SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF (CFS) = 33.12  
EFFECTIVE AREA (ACRES) = 53.20 AREA-AVERAGED Fm (INCH/HR) = 0.12  
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.50  
TOTAL AREA (ACRES) = 53.2 PEAK FLOW RATE (CFS) = 160.72

\*\*\*\*\*  
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)<<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 606.00 DOWNSTREAM(FEET) = 604.00
FLOW LENGTH(FEET) = 222.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.61
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 160.72
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 9.22
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 124.00 = 2006.00 FEET.

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*****
FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 9.22
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.411
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS C 0.10 0.25 0.200 69
COMMERCIAL C 1.60 0.25 0.100 69
PUBLIC PARK C 0.20 0.25 0.850 69
APARTMENTS D 0.30 0.20 0.200 75
COMMERCIAL D 2.10 0.20 0.100 75
PUBLIC PARK D 0.60 0.20 0.850 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.231
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 14.82
EFFECTIVE AREA(ACRES) = 58.10 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 58.1 PEAK FLOW RATE(CFS) = 172.53

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A-23

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*****
FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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```

=====
MAINLINE Tc(MIN.) = 9.22
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.411
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.20 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.61
EFFECTIVE AREA(ACRES) = 58.30 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 58.3 PEAK FLOW RATE(CFS) = 173.14

```

A-23

```

*****
FLOW PROCESS FROM NODE 124.00 TO NODE 125.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 604.00 DOWNSTREAM(FEET) = 546.00
FLOW LENGTH(FEET) = 1271.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.78
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 173.14
PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 10.11
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 125.00 = 3277.00 FEET.

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*****
FLOW PROCESS FROM NODE 125.00 TO NODE 125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 10.11
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.238
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS C 0.50 0.25 0.200 69
COMMERCIAL C 1.20 0.25 0.100 69
RESIDENTIAL
".4 DWELLING/ACRE" C 1.20 0.25 0.900 69
APARTMENTS D 0.10 0.20 0.200 75
COMMERCIAL D 1.60 0.20 0.100 75
RESIDENTIAL
".4 DWELLING/ACRE" D 3.00 0.20 0.900 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.550
SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 21.33
EFFECTIVE AREA(ACRES) = 65.90 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 65.9 PEAK FLOW RATE(CFS) = 185.37

```

A-25

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*****
FLOW PROCESS FROM NODE 125.00 TO NODE 125.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 10.11
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.238
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS C 1.90 0.25 0.200 69
RESIDENTIAL
".4 DWELLING/ACRE" C 0.60 0.25 0.900 69
RESIDENTIAL
"3-4 DWELLINGS/ACRE" C 0.30 0.25 0.600 69
APARTMENTS D 5.00 0.20 0.200 75
PUBLIC PARK D 2.30 0.20 0.850 75
RESIDENTIAL
".4 DWELLING/ACRE" D 3.50 0.20 0.900 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 38.28
EFFECTIVE AREA(ACRES) = 79.50 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.49

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A-25.1

TOTAL AREA (ACRES) = 79.5 PEAK FLOW RATE (CFS) = 223.66

\*\*\*\*\*

FLOW PROCESS FROM NODE 125.00 TO NODE 125.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.11

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.238

A-25.1

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	10.20	0.20	0.600	75

RESIDENTIAL

"3-4 DWELLINGS/ACRE" D 10.20 0.20 0.600 75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600

SUBAREA AREA (ACRES) = 10.20 SUBAREA RUNOFF (CFS) = 28.62

EFFECTIVE AREA (ACRES) = 89.70 AREA-AVERAGED Fm (INCH/HR) = 0.11

AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.50

TOTAL AREA (ACRES) = 89.7 PEAK FLOW RATE (CFS) = 252.28

\*\*\*\*\*

FLOW PROCESS FROM NODE 125.00 TO NODE 126.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 546.00 DOWNSTREAM (FEET) = 525.00

FLOW LENGTH (FEET) = 562.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.6 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 23.87

ESTIMATED PIPE DIAMETER (INCH) = 48.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 252.28

PIPE TRAVEL TIME (MIN.) = 0.39 Tc (MIN.) = 10.51

LONGEST FLOWPATH FROM NODE 120.00 TO NODE 126.00 = 3839.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 126.00 TO NODE 126.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.51

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.169

A-26

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	C	5.90	0.25	0.200	69
COMMERCIAL	C	0.10	0.25	0.100	69
RESIDENTIAL					
"4 DWELLING/ACRE"	C	0.60	0.25	0.900	69
APARTMENTS	D	6.00	0.20	0.200	75
COMMERCIAL	D	1.10	0.20	0.100	75
RESIDENTIAL					
"4 DWELLING/ACRE"	D	4.70	0.20	0.900	75

RESIDENTIAL

"4 DWELLING/ACRE" C 0.60 0.25 0.900 69

APARTMENTS D 6.00 0.20 0.200 75

COMMERCIAL D 1.10 0.20 0.100 75

RESIDENTIAL

"4 DWELLING/ACRE" D 4.70 0.20 0.900 75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.21

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.395

SUBAREA AREA (ACRES) = 18.40 SUBAREA RUNOFF (CFS) = 51.08

EFFECTIVE AREA (ACRES) = 108.10 AREA-AVERAGED Fm (INCH/HR) = 0.11

AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.49

TOTAL AREA (ACRES) = 108.1 PEAK FLOW RATE (CFS) = 297.79

\*\*\*\*\*

FLOW PROCESS FROM NODE 126.00 TO NODE 127.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 525.00 DOWNSTREAM (FEET) = 514.00

FLOW LENGTH (FEET) = 607.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.3 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 19.16

ESTIMATED PIPE DIAMETER (INCH) = 60.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 297.79

PIPE TRAVEL TIME (MIN.) = 0.53 Tc (MIN.) = 11.03

LONGEST FLOWPATH FROM NODE 120.00 TO NODE 127.00 = 4446.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 11.03

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.082

A-27

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.50	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
APARTMENTS	C	1.10	0.25	0.200	69
COMMERCIAL	C	12.70	0.25	0.100	69
PUBLIC PARK	C	0.80	0.25	0.850	69
RESIDENTIAL					
"4 DWELLING/ACRE"	C	4.10	0.25	0.900	69

COMMERCIAL

PUBLIC PARK

APARTMENTS

COMMERCIAL

PUBLIC PARK

RESIDENTIAL

"4 DWELLING/ACRE" C 4.10 0.25 0.900 69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303

SUBAREA AREA (ACRES) = 20.40 SUBAREA RUNOFF (CFS) = 55.18

EFFECTIVE AREA (ACRES) = 128.50 AREA-AVERAGED Fm (INCH/HR) = 0.10

AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.46

TOTAL AREA (ACRES) = 128.5 PEAK FLOW RATE (CFS) = 344.53

\*\*\*\*\*

FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 11.03

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.082

A-27

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	1.20	0.20	0.100	75
PUBLIC PARK	D	1.50	0.20	0.850	75
RESIDENTIAL					
"4 DWELLING/ACRE"	D	0.10	0.20	0.900	75

COMMERCIAL

PUBLIC PARK

RESIDENTIAL

"4 DWELLING/ACRE" D 0.10 0.20 0.900 75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530

SUBAREA AREA (ACRES) = 2.80 SUBAREA RUNOFF (CFS) = 7.50  
EFFECTIVE AREA (ACRES) = 131.30 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.46  
TOTAL AREA (ACRES) = 131.3 PEAK FLOW RATE (CFS) = 352.03

\*\*\*\*\*  
FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 11.03  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.082 **A-28**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 1.00 0.30 0.100 56  
COMMERCIAL C 1.30 0.25 0.100 69  
COMMERCIAL D 12.60 0.20 0.100 75  
PUBLIC PARK D 1.10 0.20 0.850 75  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" D 0.10 0.20 0.200 75  
RESIDENTIAL  
".4 DWELLING/ACRE" D 2.10 0.20 0.900 75  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.238  
SUBAREA AREA (ACRES) = 18.20 SUBAREA RUNOFF (CFS) = 49.68  
EFFECTIVE AREA (ACRES) = 149.50 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.43  
TOTAL AREA (ACRES) = 149.5 PEAK FLOW RATE (CFS) = 401.71

\*\*\*\*\*  
FLOW PROCESS FROM NODE 127.00 TO NODE 128.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 514.00 DOWNSTREAM (FEET) = 473.00  
FLOW LENGTH (FEET) = 741.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.6 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 31.29  
ESTIMATED PIPE DIAMETER (INCH) = 54.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 401.71  
PIPE TRAVEL TIME (MIN.) = 0.39 Tc (MIN.) = 11.43  
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 128.00 = 5187.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 11.43  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.021 **A-29**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 2.20 0.25 0.100 69  
RESIDENTIAL  
".4 DWELLING/ACRE" C 0.40 0.25 0.900 69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.223  
SUBAREA AREA (ACRES) = 2.60 SUBAREA RUNOFF (CFS) = 6.94  
EFFECTIVE AREA (ACRES) = 152.10 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.43  
TOTAL AREA (ACRES) = 152.1 PEAK FLOW RATE (CFS) = 401.71  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 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.) = 11.43  
RAINFALL INTENSITY (INCH/HR) = 3.02  
AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.22  
AREA-AVERAGED Ap = 0.43  
EFFECTIVE STREAM AREA (ACRES) = 152.10  
TOTAL STREAM AREA (ACRES) = 152.10  
PEAK FLOW RATE (CFS) AT CONFLUENCE = 401.71

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	475.12	11.54	3.005	0.25 (0.08)	0.31	176.1	110.00
1	463.10	18.33	2.312	0.25 (0.07)	0.29	227.3	100.00
2	401.71	11.43	3.021	0.22 (0.10)	0.43	152.1	120.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	874.96	11.43	3.021	0.23 (0.09)	0.37	326.6	120.00
2	874.62	11.54	3.005	0.24 (0.09)	0.36	328.2	110.00
3	767.47	18.33	2.312	0.24 (0.08)	0.34	379.4	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
PEAK FLOW RATE (CFS) = 874.96 Tc (MIN.) = 11.43  
EFFECTIVE AREA (ACRES) = 326.56 AREA-AVERAGED Fm (INCH/HR) = 0.09  
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.37  
TOTAL AREA (ACRES) = 379.4  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 128.00 = 6371.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 128.00 TO NODE 129.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 473.00 DOWNSTREAM (FEET) = 455.00  
FLOW LENGTH (FEET) = 1494.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 96.0 INCH PIPE IS 72.6 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 21.44  
 ESTIMATED PIPE DIAMETER (INCH) = 96.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 874.96  
 PIPE TRAVEL TIME (MIN.) = 1.16 Tc (MIN.) = 12.59  
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 129.00 = 7865.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*  
 MAINLINE Tc (MIN.) = 12.59  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.860 **A-30**  
 SUBAREA LOSS RATE DATA (AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.60	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
COMMERCIAL	C	1.80	0.25	0.100	69
RESIDENTIAL					
"4 DWELLING/ACRE"	C	1.40	0.25	0.900	69
COMMERCIAL	D	0.80	0.20	0.100	75
RESIDENTIAL					
"4 DWELLING/ACRE"	D	1.60	0.20	0.900	75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.524  
 SUBAREA AREA (ACRES) = 6.80 SUBAREA RUNOFF (CFS) = 16.74  
 EFFECTIVE AREA (ACRES) = 333.36 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA (ACRES) = 386.2 PEAK FLOW RATE (CFS) = 874.96  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*  
 MAINLINE Tc (MIN.) = 12.59  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.860 **A-31**  
 SUBAREA LOSS RATE DATA (AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.50	0.30	0.100	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.20	0.30	0.500	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.344  
 SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 11.66  
 EFFECTIVE AREA (ACRES) = 338.06 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.37

TOTAL AREA (ACRES) = 390.9 PEAK FLOW RATE (CFS) = 874.96  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*  
 MAINLINE Tc (MIN.) = 12.59  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.860 **A-31**  
 SUBAREA LOSS RATE DATA (AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.90	0.30	0.400	56
COMMERCIAL	C	4.70	0.25	0.100	69
PUBLIC PARK	C	1.30	0.25	0.850	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.90	0.25	0.200	69
RESIDENTIAL					
"4 DWELLING/ACRE"	C	0.10	0.25	0.900	69
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	3.80	0.25	0.600	69

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.26  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.386  
 SUBAREA AREA (ACRES) = 13.70 SUBAREA RUNOFF (CFS) = 34.02  
 EFFECTIVE AREA (ACRES) = 351.76 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA (ACRES) = 404.6 PEAK FLOW RATE (CFS) = 877.82

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*  
 MAINLINE Tc (MIN.) = 12.59  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.860 **A-31**  
 SUBAREA LOSS RATE DATA (AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	4.40	0.25	0.500	69
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	0.70	0.25	0.400	69
COMMERCIAL	D	5.00	0.20	0.100	75
PUBLIC PARK	D	0.10	0.20	0.850	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	10.30	0.20	0.200	75
RESIDENTIAL					
"4 DWELLING/ACRE"	D	0.10	0.20	0.900	75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.22  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.253  
 SUBAREA AREA (ACRES) = 20.60 SUBAREA RUNOFF (CFS) = 51.98  
 EFFECTIVE AREA (ACRES) = 372.36 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA (ACRES) = 425.2 PEAK FLOW RATE (CFS) = 929.80

\*\*\*\*\*

FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 12.59 **A-31**  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.860  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	1.30	0.20	0.600	75
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	D	3.90	0.20	0.500	75
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	2.30	0.20	0.400	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.487  
 SUBAREA AREA(ACRES) = 7.50 SUBAREA RUNOFF(CFS) = 18.65  
 EFFECTIVE AREA(ACRES) = 379.86 AREA-AVERAGED Fm(INCH/HR) = 0.09  
 AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA(ACRES) = 432.7 PEAK FLOW RATE(CFS) = 948.45

\*\*\*\*\*  
FLOW PROCESS FROM NODE 129.00 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) = 455.00 DOWNSTREAM(FEET) = 410.00  
 FLOW LENGTH(FEET) = 1786.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 84.0 INCH PIPE IS 67.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.49  
 ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 948.45  
 PIPE TRAVEL TIME(MIN.) = 1.04 Tc(MIN.) = 13.64  
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 130.00 = 9651.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.64 **A-32**  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.734  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.30	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.20	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
COMMERCIAL	C	1.30	0.25	0.100	69
PUBLIC PARK	C	0.10	0.25	0.850	69
RESIDENTIAL					
".4 DWELLING/ACRE"	C	3.00	0.25	0.900	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.598

SUBAREA AREA(ACRES) = 7.00 SUBAREA RUNOFF(CFS) = 16.22  
 EFFECTIVE AREA(ACRES) = 386.86 AREA-AVERAGED Fm(INCH/HR) = 0.09  
 AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA(ACRES) = 439.7 PEAK FLOW RATE(CFS) = 948.45  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.64 **A-32**  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.734  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	2.50	0.25	0.600	69
COMMERCIAL	D	0.80	0.20	0.100	75
RESIDENTIAL					
".4 DWELLING/ACRE"	D	1.30	0.20	0.900	75
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	3.30	0.20	0.600	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.599  
 SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 18.52  
 EFFECTIVE AREA(ACRES) = 394.76 AREA-AVERAGED Fm(INCH/HR) = 0.09  
 AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA(ACRES) = 447.6 PEAK FLOW RATE(CFS) = 948.45  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

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

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

\*\*\*\*\*

FLOW PROCESS FROM NODE 150.00 TO NODE 151.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00  
 ELEVATION DATA: UPSTREAM(FEET) = 765.00 DOWNSTREAM(FEET) = 675.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20 **OA-4**  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.312  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.392  
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER						
"OPEN BRUSH"	C	1.50	0.25	1.000	77	9.31
NATURAL FAIR COVER						
"WOODLAND,GRASS"	C	0.40	0.25	1.000	77	9.31

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF(CFS) = 5.37  
TOTAL AREA (ACRES) = 1.90 PEAK FLOW RATE (CFS) = 5.37

\*\*\*\*\*  
FLOW PROCESS FROM NODE 151.00 TO NODE 152.00 IS CODE = 51

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	675.00	DOWNSTREAM(FEET) =	635.00
CHANNEL LENGTH THRU SUBAREA(FEET) =	421.00	CHANNEL SLOPE =	0.0950
CHANNEL BASE(FEET) =	0.00	"Z" FACTOR =	3.000
MANNING'S FACTOR =	0.040	MAXIMUM DEPTH(FEET) =	20.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	3.186		

OA-5

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	C	4.90	0.25	1.000	77
NATURAL FAIR COVER "WOODLAND,GRASS"	C	2.40	0.25	1.000	77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.03  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.44  
AVERAGE FLOW DEPTH(FEET) = 0.88 TRAVEL TIME(MIN.) = 1.09  
Tc(MIN.) = 10.40  
SUBAREA AREA(ACRES) = 7.30 SUBAREA RUNOFF(CFS) = 19.29  
EFFECTIVE AREA(ACRES) = 9.20 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 9.2 PEAK FLOW RATE(CFS) = 24.31

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 1.06 FLOW VELOCITY(FEET/SEC.) = 7.25  
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 152.00 = 751.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 152.00 TO NODE 153.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	635.00	DOWNSTREAM(FEET) =	631.00
FLOW LENGTH(FEET) =	501.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	27.0 INCH PIPE IS	20.5 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	7.50		
ESTIMATED PIPE DIAMETER(INCH) =	27.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	24.31		
PIPE TRAVEL TIME(MIN.) =	1.11	Tc(MIN.) =	11.52
LONGEST FLOWPATH FROM NODE	150.00 TO NODE	153.00 =	1252.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 153.00 TO NODE 153.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) =	11.52
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	3.008

OA-6

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	C	5.10	0.25	1.000	77
NATURAL FAIR COVER "WOODLAND,GRASS"	C	4.00	0.25	1.000	77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 22.59  
EFFECTIVE AREA(ACRES) = 18.30 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 18.3 PEAK FLOW RATE(CFS) = 45.43

\*\*\*\*\*  
FLOW PROCESS FROM NODE 153.00 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) =	631.00	DOWNSTREAM(FEET) =	630.00
FLOW LENGTH(FEET) =	711.00	MANNING'S N =	0.013
DEPTH OF FLOW IN	48.0 INCH PIPE IS	35.2 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	4.59		
ESTIMATED PIPE DIAMETER(INCH) =	48.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	45.43		
PIPE TRAVEL TIME(MIN.) =	2.58	Tc(MIN.) =	14.10
LONGEST FLOWPATH FROM NODE	150.00 TO NODE	154.00 =	1963.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) =	14.10
* 25 YEAR RAINFALL INTENSITY(INCH/HR) =	2.683

OA-7

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	C	0.30	0.25	1.000	75
NATURAL FAIR COVER "CHAPARRAL,NARROWLEAF"	C	5.70	0.25	1.000	81
NATURAL FAIR COVER "OPEN BRUSH"	C	3.40	0.25	1.000	77
NATURAL FAIR COVER "WOODLAND,GRASS"	C	0.10	0.25	1.000	77
NATURAL FAIR COVER "CHAPARRAL,NARROWLEAF"	D	2.10	0.20	1.000	86
NATURAL FAIR COVER "OPEN BRUSH"	D	1.60	0.20	1.000	83

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA AREA(ACRES) = 13.20 SUBAREA RUNOFF(CFS) = 29.07  
EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 69.14

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*****
FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.10
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.683
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL   AREA      Fp        Ap    SCS
LAND USE             GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"WOODLAND,GRASS"    D         0.20    0.20    1.000    82
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 0.20    SUBAREA RUNOFF(CFS) = 0.45
EFFECTIVE AREA(ACRES) = 31.70    AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.24    AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.7    PEAK FLOW RATE(CFS) = 69.59

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OA-7

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*****
FLOW PROCESS FROM NODE 154.00 TO NODE 155.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 630.00 DOWNSTREAM(FEET) = 628.00
FLOW LENGTH(FEET) = 910.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.01
ESTIMATED PIPE DIAMETER(INCH) = 51.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 69.59
PIPE TRAVEL TIME(MIN.) = 2.52    Tc(MIN.) = 16.62
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 155.00 = 2873.00 FEET.

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*****
FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.62
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.444
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL   AREA      Fp        Ap    SCS
LAND USE             GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" C         1.60    0.25    1.000    75
NATURAL FAIR COVER
"OPEN BRUSH"        C         1.60    0.25    1.000    77
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" D         1.80    0.20    1.000    81
NATURAL FAIR COVER
"OPEN BRUSH"        D         1.50    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 6.50    SUBAREA RUNOFF(CFS) = 12.98
EFFECTIVE AREA(ACRES) = 38.20    AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.24    AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 38.2    PEAK FLOW RATE(CFS) = 75.76

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OA-8

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*****
FLOW PROCESS FROM NODE 155.00 TO NODE 156.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 629.00 DOWNSTREAM(FEET) = 610.00
FLOW LENGTH(FEET) = 796.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.87
ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 75.76
PIPE TRAVEL TIME(MIN.) = 0.89    Tc(MIN.) = 17.51
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 156.00 = 3669.00 FEET.

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*****
FLOW PROCESS FROM NODE 156.00 TO NODE 156.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.51
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.373
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL   AREA      Fp        Ap    SCS
LAND USE             GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" C         1.90    0.25    1.000    75
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" C         0.40    0.25    1.000    81
NATURAL FAIR COVER
"OPEN BRUSH"        C         1.30    0.25    1.000    77
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" D         4.50    0.20    1.000    81
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" D         1.30    0.20    1.000    86
NATURAL FAIR COVER
"OPEN BRUSH"        D         3.70    0.20    1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 13.10    SUBAREA RUNOFF(CFS) = 25.46
EFFECTIVE AREA(ACRES) = 51.30    AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.23    AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 51.3    PEAK FLOW RATE(CFS) = 98.77

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OA-9

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*****
FLOW PROCESS FROM NODE 156.00 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) = 610.00 DOWNSTREAM(FEET) = 410.00
FLOW LENGTH(FEET) = 6198.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.11
ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 98.77
PIPE TRAVEL TIME(MIN.) = 5.70    Tc(MIN.) = 23.22

```

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 130.00 = 9867.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 11

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

\*\* MAIN STREAM CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	98.77	23.22	2.023	0.23( 0.23)	1.00	51.3	150.00

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 130.00 = 9867.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	948.45	13.64	2.734	0.24( 0.09)	0.37	394.8	120.00
2	947.84	13.74	2.722	0.24( 0.09)	0.37	396.4	110.00
3	837.78	20.61	2.164	0.24( 0.08)	0.36	447.6	100.00

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 130.00 = 9651.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1029.51	13.64	2.734	0.24( 0.10)	0.42	424.9	120.00
2	1029.14	13.74	2.722	0.24( 0.10)	0.42	426.8	110.00
3	932.37	20.61	2.164	0.24( 0.10)	0.41	493.1	100.00
4	879.77	23.22	2.023	0.24( 0.10)	0.42	498.9	150.00

TOTAL AREA (ACRES) = 498.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1029.51 Tc(MIN.) = 13.635  
EFFECTIVE AREA(ACRES) = 424.90 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.42  
TOTAL AREA(ACRES) = 498.9  
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 130.00 = 9867.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 13.64

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.734

A-33

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
AGRICULTURAL POOR COVER "FALLOW"	B	1.60	0.30	1.000	86
NATURAL FAIR COVER "OPEN BRUSH"	B	1.30	0.30	1.000	66
RESIDENTIAL ".4 DWELLING/ACRE"	B	2.60	0.30	0.900	56
NATURAL FAIR COVER "WOODLAND,GRASS"	B	1.90	0.30	1.000	65
AGRICULTURAL POOR COVER "FALLOW"	C	0.70	0.25	1.000	91

NATURAL FAIR COVER

"OPEN BRUSH" C 0.80 0.25 1.000 77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.29

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.971

SUBAREA AREA(ACRES) = 8.90 SUBAREA RUNOFF(CFS) = 19.63

EFFECTIVE AREA(ACRES) = 433.80 AREA-AVERAGED Fm(INCH/HR) = 0.10

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.43

TOTAL AREA(ACRES) = 507.8 PEAK FLOW RATE(CFS) = 1029.51

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 13.64

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.734

A-33

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	C	0.10	0.25	0.850	69
RESIDENTIAL ".4 DWELLING/ACRE"	C	1.50	0.25	0.900	69
NATURAL FAIR COVER "WOODLAND,GRASS"	C	0.40	0.25	1.000	77
NATURAL FAIR COVER "OPEN BRUSH"	D	0.10	0.20	1.000	83
RESIDENTIAL ".4 DWELLING/ACRE"	D	0.30	0.20	0.900	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.919  
SUBAREA AREA(ACRES) = 2.40 SUBAREA RUNOFF(CFS) = 5.43  
EFFECTIVE AREA(ACRES) = 436.20 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.43  
TOTAL AREA(ACRES) = 510.2 PEAK FLOW RATE(CFS) = 1032.92

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 510.2 TC(MIN.) = 13.64  
EFFECTIVE AREA(ACRES) = 436.20 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.432  
PEAK FLOW RATE(CFS) = 1032.92

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1032.92	13.64	2.734	0.24( 0.10)	0.43	436.2	120.00
2	1032.59	13.74	2.722	0.24( 0.10)	0.43	438.1	110.00
3	936.15	20.61	2.164	0.24( 0.10)	0.43	504.4	100.00
4	881.43	23.22	2.023	0.24( 0.10)	0.43	510.2	150.00

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
(c) Copyright 1983-2013 Advanced Engineering Software (aes)  
Ver. 20.0 Release Date: 06/01/2013 License ID 1237

Analysis prepared by:

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* RMV PA-3 SUBWATERSHED B BODR 2022 \*  
\* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
\* 100-YR HC JULY 2022 ROKAMOTO \*  
\*\*\*\*\*

FILE NAME: PA3B00HC.DAT  
TIME/DATE OF STUDY: 13:13 07/11/2022

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*DATA BANK RAINFALL USED\*  
\*ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD\*

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

NO.	WIDTH (FT)	CROWN (FT)	CROSSFALL IN- / OUT- / PARK- SIDE / SIDE/ WAY	STREET-CROSSFALL: HEIGHT (FT)	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES: LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150	
2	32.0	27.0	0.020/0.020/ ---	0.67	2.00	0.0312	0.167	0.0150	
3	13.0	8.0	0.020/0.020/ ---	0.33	1.00	0.0312	0.125	0.0150	

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 1.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  - (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 203.00 TO NODE 204.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 305.00  
ELEVATION DATA: UPSTREAM(FEET) = 410.00 DOWNSTREAM(FEET) = 402.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.206  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.467  
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	B	0.30	0.30	0.100	76	6.21
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	B	0.20	0.30	0.200	76	6.61
RESIDENTIAL						
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	76	9.94
COMMERCIAL	C	0.30	0.25	0.100	86	6.21
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	0.60	0.25	0.200	86	6.61

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.207  
SUBAREA RUNOFF(CFS) = 7.30  
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 7.30

B-5

\*\*\*\*\*  
FLOW PROCESS FROM NODE 204.00 TO NODE 205.00 IS CODE = 62  
-----

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

UPSTREAM ELEVATION(FEET) = 402.00 DOWNSTREAM ELEVATION(FEET) = 385.00  
STREET LENGTH(FEET) = 515.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

B-6

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.08  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.39  
HALFSTREET FLOOD WIDTH(FEET) = 12.46  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.45  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.71  
STREET FLOW TRAVEL TIME(MIN.) = 1.93 Tc(MIN.) = 8.13  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.682

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.40	0.30	0.100	76
COMMERCIAL	C	0.50	0.25	0.100	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.80	0.25	0.200	86
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.40	0.30	0.900	76
RESIDENTIAL					
".4 DWELLING/ACRE"	C	1.20	0.25	0.900	86

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.512  
SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 13.51  
EFFECTIVE AREA(ACRES) = 4.80 AREA-AVERAGED Fm(INCH/HR) = 0.11  
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.42  
TOTAL AREA(ACRES) = 4.8 PEAK FLOW RATE(CFS) = 19.75

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.41  
FLOW VELOCITY(FEET/SEC.) = 4.82 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.02  
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 205.00 = 820.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 62  
-----

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

UPSTREAM ELEVATION(FEET) = 385.00 DOWNSTREAM ELEVATION(FEET) = 375.00  
STREET LENGTH(FEET) = 386.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00 **B-7**  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.95  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.46  
HALFSTREET FLOOD WIDTH(FEET) = 16.76  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.62  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.13  
STREET FLOW TRAVEL TIME(MIN.) = 1.39 Tc(MIN.) = 9.53  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.276

SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 0.30 0.30 0.100 76  
COMMERCIAL C 0.40 0.25 0.100 86  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 76  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 0.30 0.25 0.200 86  
RESIDENTIAL  
".4 DWELLING/ACRE" B 0.20 0.30 0.900 76  
RESIDENTIAL  
".4 DWELLING/ACRE" C 1.50 0.25 0.900 86  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600  
SUBAREA AREA(ACRES) = 2.80 SUBAREA RUNOFF(CFS) = 10.39  
EFFECTIVE AREA(ACRES) = 7.60 AREA-AVERAGED Fm(INCH/HR) = 0.13  
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 7.6 PEAK FLOW RATE(CFS) = 28.39

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.62  
FLOW VELOCITY(FEET/SEC.) = 4.79 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.28  
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 206.00 = 1206.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

MAINLINE Tc(MIN.) = 9.53  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.276 **B-8**  
SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL B 0.70 0.30 0.100 76  
COMMERCIAL C 2.50 0.25 0.100 86  
COMMERCIAL D 0.30 0.20 0.100 91  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" B 0.30 0.30 0.200 76  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 0.10 0.25 0.200 86  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" D 0.20 0.20 0.200 91  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.115  
SUBAREA AREA(ACRES) = 4.10 SUBAREA RUNOFF(CFS) = 15.67  
EFFECTIVE AREA(ACRES) = 11.70 AREA-AVERAGED Fm(INCH/HR) = 0.09  
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 11.7 PEAK FLOW RATE(CFS) = 44.06

\*\*\*\*\*  
FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

MAINLINE Tc(MIN.) = 9.53  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.276 **B-8**  
SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
".4 DWELLING/ACRE" B 2.60 0.30 0.900 76  
RESIDENTIAL  
".4 DWELLING/ACRE" C 9.30 0.25 0.900 86  
RESIDENTIAL  
".4 DWELLING/ACRE" D 1.50 0.20 0.900 91  
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.900  
SUBAREA AREA(ACRES) = 13.40 SUBAREA RUNOFF(CFS) = 48.81  
EFFECTIVE AREA(ACRES) = 25.10 AREA-AVERAGED Fm(INCH/HR) = 0.17  
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.65  
TOTAL AREA(ACRES) = 25.1 PEAK FLOW RATE(CFS) = 92.87

\*\*\*\*\*  
FLOW PROCESS FROM NODE 206.00 TO NODE 207.00 IS CODE = 31  
-----

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 375.00 DOWNSTREAM(FEET) = 353.00
FLOW LENGTH(FEET) = 1217.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.33
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 92.87
PIPE TRAVEL TIME(MIN.) = 1.42 Tc(MIN.) = 10.94
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 207.00 = 2423.00 FEET.

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*****
FLOW PROCESS FROM NODE 207.00 TO NODE 207.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 10.94

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* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.950
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           B         2.40    0.30   0.100   76
COMMERCIAL           C         0.20    0.25   0.100   86
COMMERCIAL           D         0.30    0.20   0.100   91
RESIDENTIAL
".4 DWELLING/ACRE"   B         2.10    0.30   0.900   76
RESIDENTIAL
".4 DWELLING/ACRE"   C         0.30    0.25   0.900   86
RESIDENTIAL
".4 DWELLING/ACRE"   D         0.50    0.20   0.900   91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 19.89
EFFECTIVE AREA(ACRES) = 30.90 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.62
TOTAL AREA(ACRES) = 30.9 PEAK FLOW RATE(CFS) = 105.39

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B-9

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*****
FLOW PROCESS FROM NODE 207.00 TO NODE 208.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

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ELEVATION DATA: UPSTREAM(FEET) = 353.00 DOWNSTREAM(FEET) = 343.00
FLOW LENGTH(FEET) = 1021.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.67
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 105.39
PIPE TRAVEL TIME(MIN.) = 1.46 Tc(MIN.) = 12.40
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 208.00 = 3444.00 FEET.

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*****
FLOW PROCESS FROM NODE 208.00 TO NODE 208.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 12.40
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.677
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           B         1.40    0.30   0.100   76
COMMERCIAL           C         1.10    0.25   0.100   86
RESIDENTIAL
".4 DWELLING/ACRE"   B         1.90    0.30   0.900   76
RESIDENTIAL
".4 DWELLING/ACRE"   C         1.60    0.25   0.900   86
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B         0.20    0.30   0.400   76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.561
SUBAREA AREA(ACRES) = 6.20 SUBAREA RUNOFF(CFS) = 19.65
EFFECTIVE AREA(ACRES) = 37.10 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.61
TOTAL AREA(ACRES) = 37.1 PEAK FLOW RATE(CFS) = 117.44

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B-10

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*****
FLOW PROCESS FROM NODE 208.00 TO NODE 209.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

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ELEVATION DATA: UPSTREAM(FEET) = 343.00 DOWNSTREAM(FEET) = 340.00
FLOW LENGTH(FEET) = 916.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 44.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.92
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 117.44
PIPE TRAVEL TIME(MIN.) = 1.93 Tc(MIN.) = 14.33
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 209.00 = 4360.00 FEET.

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*****
FLOW PROCESS FROM NODE 209.00 TO NODE 209.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 14.33
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.385
SUBAREA LOSS RATE DATA(AMC III):

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B-11

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DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           B         0.30    0.30   0.100   76
COMMERCIAL           C         0.60    0.25   0.100   86
COMMERCIAL           D         0.70    0.20   0.100   91
RESIDENTIAL
".4 DWELLING/ACRE"   B         0.40    0.30   0.900   76
RESIDENTIAL
".4 DWELLING/ACRE"   C         0.80    0.25   0.900   86
RESIDENTIAL
".4 DWELLING/ACRE"   D         0.40    0.20   0.900   91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 3.20 SUBAREA RUNOFF(CFS) = 9.39
EFFECTIVE AREA(ACRES) = 40.30 AREA-AVERAGED Fm(INCH/HR) = 0.16

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AREA-AVERAGED Fp (INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.60  
TOTAL AREA (ACRES) = 40.3 PEAK FLOW RATE (CFS) = 117.44  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 209.00 TO NODE 209.10 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 340.00 DOWNSTREAM(FEET) = 331.00  
FLOW LENGTH(FEET) = 960.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.87  
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 117.44  
PIPE TRAVEL TIME(MIN.) = 1.35 Tc(MIN.) = 15.68  
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 209.10 = 5320.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 209.10 TO NODE 209.10 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

MAINLINE Tc(MIN.) = 15.68  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.215  
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.00	0.30	0.100	76
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.40	0.30	0.200	76
COMMERCIAL	C	0.40	0.25	0.100	86
COMMERCIAL	D	2.20	0.20	0.100	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.70	0.20	0.200	91
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	1.10	0.20	0.400	91

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.176  
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 16.58  
EFFECTIVE AREA(ACRES) = 46.10 AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.55  
TOTAL AREA(ACRES) = 46.1 PEAK FLOW RATE(CFS) = 127.49

B-12

\*\*\*\*\*  
FLOW PROCESS FROM NODE 209.10 TO NODE 230.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 331.00 DOWNSTREAM(FEET) = 330.00  
FLOW LENGTH(FEET) = 205.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 54.0 INCH PIPE IS 43.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.34  
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 127.49  
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 16.04

LONGEST FLOWPATH FROM NODE 203.00 TO NODE 230.00 = 5525.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 230.00 TO NODE 230.00 IS CODE = 1  
-----

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

=====

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 16.04  
RAINFALL INTENSITY(INCH/HR) = 3.17  
AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.26  
AREA-AVERAGED Ap = 0.55  
EFFECTIVE STREAM AREA(ACRES) = 46.10  
TOTAL STREAM AREA(ACRES) = 46.10  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 127.49

\*\*\*\*\*  
FLOW PROCESS FROM NODE 210.00 TO NODE 211.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 328.00  
ELEVATION DATA: UPSTREAM(FEET) = 426.00 DOWNSTREAM(FEET) = 423.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.407  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.594

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	B	0.50	0.30	0.200	76	8.41
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	1.20	0.25	0.200	86	8.41

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 6.95  
TOTAL AREA(ACRES) = 1.70 PEAK FLOW RATE(CFS) = 6.95

B-14

\*\*\*\*\*  
FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 423.00 DOWNSTREAM(FEET) = 421.00  
FLOW LENGTH(FEET) = 385.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.63  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 6.95  
PIPE TRAVEL TIME(MIN.) = 1.39 Tc(MIN.) = 9.79  
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 713.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 9.79  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.209 **B-15**  
 SUBAREA LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" B 1.10 0.30 0.200 76  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 1.40 0.25 0.200 86  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" D 1.80 0.20 0.200 91  
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 4.30 SUBAREA RUNOFF(CFS) = 16.10  
 EFFECTIVE AREA(ACRES) = 6.00 AREA-AVERAGED Fm(INCH/HR) = 0.05  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 6.0 PEAK FLOW RATE(CFS) = 22.46

\*\*\*\*\* FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 31 \*\*\*\*\*

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

ELEVATION DATA: UPSTREAM(FEET) = 421.00 DOWNSTREAM(FEET) = 415.00  
 FLOW LENGTH(FEET) = 567.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.33  
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 22.46  
 PIPE TRAVEL TIME(MIN.) = 1.14 Tc(MIN.) = 10.93  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 1280.00 FEET.

\*\*\*\*\* FLOW PROCESS FROM NODE 213.00 TO NODE 213.00 IS CODE = 81 \*\*\*\*\*

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.93  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.953 **B-16**  
 SUBAREA LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" B 1.90 0.30 0.200 76  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 5.70 0.25 0.200 86  
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 26.68  
 EFFECTIVE AREA(ACRES) = 13.60 AREA-AVERAGED Fm(INCH/HR) = 0.05  
 AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 13.6 PEAK FLOW RATE(CFS) = 47.76

\*\*\*\*\* FLOW PROCESS FROM NODE 213.00 TO NODE 214.00 IS CODE = 31 \*\*\*\*\*

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

ELEVATION DATA: UPSTREAM(FEET) = 415.00 DOWNSTREAM(FEET) = 409.00  
 FLOW LENGTH(FEET) = 747.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.99  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 47.76  
 PIPE TRAVEL TIME(MIN.) = 1.38 Tc(MIN.) = 12.31  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 214.00 = 2027.00 FEET.

\*\*\*\*\* FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81 \*\*\*\*\*

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 12.31  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.692 **B-17**  
 SUBAREA LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL B 0.60 0.30 0.100 76  
 COMMERCIAL C 0.30 0.25 0.100 86  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 0.20 0.25 0.200 86  
 RESIDENTIAL  
 "8-10 DWELLINGS/ACRE" B 2.90 0.30 0.400 76  
 RESIDENTIAL  
 "8-10 DWELLINGS/ACRE" C 11.40 0.25 0.400 86  
 RESIDENTIAL  
 "8-10 DWELLINGS/ACRE" D 0.90 0.20 0.400 91  
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.381  
 SUBAREA AREA(ACRES) = 16.30 SUBAREA RUNOFF(CFS) = 52.72  
 EFFECTIVE AREA(ACRES) = 29.90 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.30  
 TOTAL AREA(ACRES) = 29.9 PEAK FLOW RATE(CFS) = 97.28

\*\*\*\*\* FLOW PROCESS FROM NODE 214.00 TO NODE 215.00 IS CODE = 31 \*\*\*\*\*

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

ELEVATION DATA: UPSTREAM(FEET) = 409.00 DOWNSTREAM(FEET) = 382.00  
 FLOW LENGTH(FEET) = 1002.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.70  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 97.28  
 PIPE TRAVEL TIME(MIN.) = 1.00 Tc(MIN.) = 13.31  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 215.00 = 3029.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*

MAINLINE Tc(MIN.) = 13.31 **B-18**  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.530  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.40	0.30	0.200	76
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	7.10	0.30	0.500	76
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.60	0.25	0.500	86
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	D	0.30	0.20	0.500	91
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	10.50	0.30	0.400	76
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	9.40	0.25	0.400	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.419  
 SUBAREA AREA (ACRES) = 33.30 SUBAREA RUNOFF(CFS) = 102.30  
 EFFECTIVE AREA (ACRES) = 63.20 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA (ACRES) = 63.2 PEAK FLOW RATE (CFS) = 195.24

\*\*\*\*\*

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*

MAINLINE Tc(MIN.) = 13.31 **B-18**  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.530  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	0.30	0.20	0.400	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400  
 SUBAREA AREA (ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.93  
 EFFECTIVE AREA (ACRES) = 63.50 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA (ACRES) = 63.5 PEAK FLOW RATE (CFS) = 196.17

\*\*\*\*\*

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

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

\*\*\*\*\*

ELEVATION DATA: UPSTREAM(FEET) = 382.00 DOWNSTREAM(FEET) = 373.00  
 FLOW LENGTH(FEET) = 1218.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 45.5 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 12.28  
 ESTIMATED PIPE DIAMETER (INCH) = 60.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 196.17  
PIPE TRAVEL TIME (MIN.) = 1.65 Tc(MIN.) = 14.97  
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 218.00 = 4247.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 218.00 TO NODE 218.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*

MAINLINE Tc(MIN.) = 14.97 **B-21**  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.301  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	7.70	0.30	0.200	76
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.40	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	1.70	0.20	0.200	91
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.40	0.30	0.500	76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.212  
 SUBAREA AREA (ACRES) = 10.20 SUBAREA RUNOFF(CFS) = 29.76  
 EFFECTIVE AREA (ACRES) = 73.70 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.34  
 TOTAL AREA (ACRES) = 73.7 PEAK FLOW RATE (CFS) = 212.84

\*\*\*\*\*

FLOW PROCESS FROM NODE 218.00 TO NODE 219.00 IS CODE = 31

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

\*\*\*\*\*

ELEVATION DATA: UPSTREAM(FEET) = 373.00 DOWNSTREAM(FEET) = 347.00  
 FLOW LENGTH(FEET) = 2106.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.8 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 15.27  
 ESTIMATED PIPE DIAMETER (INCH) = 57.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 212.84  
 PIPE TRAVEL TIME (MIN.) = 2.30 Tc(MIN.) = 17.27  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 219.00 = 6353.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*

MAINLINE Tc(MIN.) = 17.27 **B-23**  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.042  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.20	0.25	0.100	86
COMMERCIAL	D	2.40	0.20	0.100	91
PUBLIC PARK	B	1.20	0.30	0.850	76
PUBLIC PARK	C	1.70	0.25	0.850	86

PUBLIC PARK D 8.50 0.20 0.850 91  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 0.70 0.40 0.200 52  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.686  
 SUBAREA AREA (ACRES) = 14.70 SUBAREA RUNOFF(CFS) = 38.24  
 EFFECTIVE AREA (ACRES) = 88.40 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA (ACRES) = 88.4 PEAK FLOW RATE (CFS) = 233.86

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 17.27  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.042 **B-23**  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.90	0.30	0.200	76
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	2.90	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	24.00	0.20	0.200	91
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.10	0.20	0.900	91
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.20	0.30	0.500	76
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	0.10	0.25	0.500	86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.205					
SUBAREA AREA (ACRES) = 30.20 SUBAREA RUNOFF(CFS) = 81.47					
EFFECTIVE AREA (ACRES) = 118.60 AREA-AVERAGED Fm (INCH/HR) = 0.09					
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.35					
TOTAL AREA (ACRES) = 118.6 PEAK FLOW RATE (CFS) = 315.33					

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 17.27  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.042 **B-23**  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.50	0.30	0.400	76
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	1.40	0.25	0.400	86
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	7.40	0.20	0.400	91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400					
SUBAREA AREA (ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 24.75					

EFFECTIVE AREA (ACRES) = 127.90 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.35  
 TOTAL AREA (ACRES) = 127.9 PEAK FLOW RATE (CFS) = 340.07

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 219.00 TO NODE 230.00 IS CODE = 31  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM (FEET) = 347.00 DOWNSTREAM (FEET) = 330.00  
 FLOW LENGTH (FEET) = 1244.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 66.0 INCH PIPE IS 49.6 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 17.77  
 ESTIMATED PIPE DIAMETER (INCH) = 66.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 340.07  
 PIPE TRAVEL TIME (MIN.) = 1.17 Tc (MIN.) = 18.43  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 230.00 = 7597.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 230.00 TO NODE 230.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 18.43  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 2.930 **B-27**  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.20	0.30	0.100	76
COMMERCIAL	D	0.70	0.20	0.100	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.90	0.30	0.200	76
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.30	0.20	0.200	91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.124					
SUBAREA AREA (ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 13.29					
EFFECTIVE AREA (ACRES) = 133.00 AREA-AVERAGED Fm (INCH/HR) = 0.09					
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.34					
TOTAL AREA (ACRES) = 133.0 PEAK FLOW RATE (CFS) = 340.49					

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 230.00 TO NODE 230.00 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.) = 18.43  
 RAINFALL INTENSITY (INCH/HR) = 2.93  
 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.25  
 AREA-AVERAGED Ap = 0.34  
 EFFECTIVE STREAM AREA (ACRES) = 133.00  
 TOTAL STREAM AREA (ACRES) = 133.00  
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 340.49



TOTAL AREA (ACRES) = 213.7 TC (MIN.) = 18.60  
 EFFECTIVE AREA (ACRES) = 213.70 AREA-AVERAGED Fm (INCH/HR) = 0.11  
 AREA-AVERAGED Fp (INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.427  
 PEAK FLOW RATE (CFS) = 539.43

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	537.78	16.21	3.154	0.26 ( 0.11)	0.43	196.5	203.00
2	539.43	18.60	2.915	0.26 ( 0.11)	0.43	213.7	210.00

=====  
 END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
(c) Copyright 1983-2013 Advanced Engineering Software (aes)  
Ver. 20.0 Release Date: 06/01/2013 License ID 1237

Analysis prepared by:

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* RMV PA-3 SUBWATERSHED B BODR 2022 \*  
\* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
\* 25-YR HC SEPT 2022 ROKAMOTO \*  
\*\*\*\*\*

FILE NAME: PA3B25HC.DAT  
TIME/DATE OF STUDY: 11:49 09/16/2022

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*DATA BANK RAINFALL USED\*  
\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	STREET-CROSSFALL HEIGHT (FT)	GUTTER WIDTH (FT)	GUTTER GEOMETRIES LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150
2	32.0	27.0	0.020/0.020/ ---	0.67	2.00	0.0312	0.167	0.0150
3	13.0	8.0	0.020/0.020/ ---	0.33	1.00	0.0312	0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 1.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  - (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 203.00 TO NODE 204.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 305.00  
ELEVATION DATA: UPSTREAM(FEET) = 410.00 DOWNSTREAM(FEET) = 402.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.206  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.268  
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	B	0.30	0.30	0.100	56	6.21
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	B	0.20	0.30	0.200	56	6.61
RESIDENTIAL						
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56	9.94
COMMERCIAL	C	0.30	0.25	0.100	69	6.21
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	0.60	0.25	0.200	69	6.61

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.207  
SUBAREA RUNOFF(CFS) = 5.69  
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 5.69

\*\*\*\*\*  
FLOW PROCESS FROM NODE 204.00 TO NODE 205.00 IS CODE = 62  
-----

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

UPSTREAM ELEVATION(FEET) = 402.00 DOWNSTREAM ELEVATION(FEET) = 385.00  
STREET LENGTH(FEET) = 515.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.90  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.36  
HALFSTREET FLOOD WIDTH(FEET) = 11.13  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.19  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.51  
STREET FLOW TRAVEL TIME(MIN.) = 2.05 Tc(MIN.) = 8.26

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.632  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.40	0.30	0.100	56
COMMERCIAL	C	0.50	0.25	0.100	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.80	0.25	0.200	69
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	C	1.20	0.25	0.900	69

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.512  
 SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 10.39  
 EFFECTIVE AREA(ACRES) = 4.80 AREA-AVERAGED Fm(INCH/HR) = 0.11  
 AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA(ACRES) = 4.8 PEAK FLOW RATE(CFS) = 15.21

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 12.93  
 FLOW VELOCITY(FEET/SEC.) = 4.51 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.77  
 LONGEST FLOWPATH FROM NODE 203.00 TO NODE 205.00 = 820.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 62  
 -----

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

=====

UPSTREAM ELEVATION(FEET) = 385.00 DOWNSTREAM ELEVATION(FEET) = 375.00  
 STREET LENGTH(FEET) = 386.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.19

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.43  
 HALFSTREET FLOOD WIDTH(FEET) = 15.04  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.33  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.87  
 STREET FLOW TRAVEL TIME(MIN.) = 1.48 Tc(MIN.) = 9.74

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.307

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.30	0.30	0.100	56
COMMERCIAL	C	0.40	0.25	0.100	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.30	0.25	0.200	69
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	C	1.50	0.25	0.900	69

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600  
 SUBAREA AREA(ACRES) = 2.80 SUBAREA RUNOFF(CFS) = 7.95  
 EFFECTIVE AREA(ACRES) = 7.60 AREA-AVERAGED Fm(INCH/HR) = 0.13  
 AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.48  
 TOTAL AREA(ACRES) = 7.6 PEAK FLOW RATE(CFS) = 21.76

END OF SUBAREA STREET FLOW HYDRAULICS:  
 DEPTH(FEET) = 0.45 HALFSTREET FLOOD WIDTH(FEET) = 15.82  
 FLOW VELOCITY(FEET/SEC.) = 4.48 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.99  
 LONGEST FLOWPATH FROM NODE 203.00 TO NODE 206.00 = 1206.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.74  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.307  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.70	0.30	0.100	56
COMMERCIAL	C	2.50	0.25	0.100	69
COMMERCIAL	D	0.30	0.20	0.100	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.30	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.10	0.25	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.20	0.20	0.200	75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.115  
 SUBAREA AREA(ACRES) = 4.10 SUBAREA RUNOFF(CFS) = 12.10  
 EFFECTIVE AREA(ACRES) = 11.70 AREA-AVERAGED Fm(INCH/HR) = 0.09  
 AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.35  
 TOTAL AREA(ACRES) = 11.7 PEAK FLOW RATE(CFS) = 33.85

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.74  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.307  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.60	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	C	9.30	0.25	0.900	69
RESIDENTIAL					
".4 DWELLING/ACRE"	D	1.50	0.20	0.900	75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.900  
 SUBAREA AREA(ACRES) = 13.40 SUBAREA RUNOFF(CFS) = 37.13  
 EFFECTIVE AREA(ACRES) = 25.10 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.65  
 TOTAL AREA(ACRES) = 25.1 PEAK FLOW RATE(CFS) = 70.98

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 206.00 TO NODE 207.00 IS CODE = 31  
 -----

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 375.00 DOWNSTREAM(FEET) = 353.00
FLOW LENGTH(FEET) = 1217.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.47
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 70.98
PIPE TRAVEL TIME(MIN.) = 1.51 Tc(MIN.) = 11.25
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 207.00 = 2423.00 FEET.

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*****
FLOW PROCESS FROM NODE 207.00 TO NODE 207.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.25
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.049
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B         2.40   0.30   0.100  56
COMMERCIAL          C         0.20   0.25   0.100  69
COMMERCIAL          D         0.30   0.20   0.100  75
RESIDENTIAL
".4 DWELLING/ACRE" B         2.10   0.30   0.900  56
RESIDENTIAL
".4 DWELLING/ACRE" C         0.30   0.25   0.900  69
RESIDENTIAL
".4 DWELLING/ACRE" D         0.50   0.20   0.900  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 15.19
EFFECTIVE AREA(ACRES) = 30.90 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.62
TOTAL AREA(ACRES) = 30.9 PEAK FLOW RATE(CFS) = 80.33

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*****
FLOW PROCESS FROM NODE 207.00 TO NODE 208.00 IS CODE = 31
-----

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 353.00 DOWNSTREAM(FEET) = 343.00
FLOW LENGTH(FEET) = 1021.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.02
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 80.33
PIPE TRAVEL TIME(MIN.) = 1.54 Tc(MIN.) = 12.79
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 208.00 = 3444.00 FEET.

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*****
FLOW PROCESS FROM NODE 208.00 TO NODE 208.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 12.79
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.835
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B         1.40   0.30   0.100  56
COMMERCIAL          C         1.10   0.25   0.100  69
RESIDENTIAL
".4 DWELLING/ACRE" B         1.90   0.30   0.900  56
RESIDENTIAL
".4 DWELLING/ACRE" C         1.60   0.25   0.900  69
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B         0.20   0.30   0.400  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.561
SUBAREA AREA(ACRES) = 6.20 SUBAREA RUNOFF(CFS) = 14.95
EFFECTIVE AREA(ACRES) = 37.10 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.61
TOTAL AREA(ACRES) = 37.1 PEAK FLOW RATE(CFS) = 89.33

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*****
FLOW PROCESS FROM NODE 208.00 TO NODE 209.00 IS CODE = 31
-----

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 343.00 DOWNSTREAM(FEET) = 340.00
FLOW LENGTH(FEET) = 916.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.36
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 89.33
PIPE TRAVEL TIME(MIN.) = 2.07 Tc(MIN.) = 14.86
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 209.00 = 4360.00 FEET.

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*****
FLOW PROCESS FROM NODE 209.00 TO NODE 209.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.86
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.604
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B         0.30   0.30   0.100  56
COMMERCIAL          C         0.60   0.25   0.100  69
COMMERCIAL          D         0.70   0.20   0.100  75
RESIDENTIAL
".4 DWELLING/ACRE" B         0.40   0.30   0.900  56
RESIDENTIAL
".4 DWELLING/ACRE" C         0.80   0.25   0.900  69
RESIDENTIAL
".4 DWELLING/ACRE" D         0.40   0.20   0.900  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 3.20 SUBAREA RUNOFF(CFS) = 7.14
EFFECTIVE AREA(ACRES) = 40.30 AREA-AVERAGED Fm(INCH/HR) = 0.16

```

AREA-AVERAGED Fp (INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.60  
TOTAL AREA (ACRES) = 40.3 PEAK FLOW RATE (CFS) = 89.33  
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
FLOW PROCESS FROM NODE 209.00 TO NODE 209.10 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 340.00 DOWNSTREAM(FEET) = 331.00  
FLOW LENGTH(FEET) = 960.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 33.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.94  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 89.33  
PIPE TRAVEL TIME(MIN.) = 1.46 Tc(MIN.) = 16.32  
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 209.10 = 5320.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 209.10 TO NODE 209.10 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

MAINLINE Tc(MIN.) = 16.32  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.469  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.00	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.40	0.30	0.200	56
COMMERCIAL	C	0.40	0.25	0.100	69
COMMERCIAL	D	2.20	0.20	0.100	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.70	0.20	0.200	75
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	1.10	0.20	0.400	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.176  
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 12.69  
EFFECTIVE AREA(ACRES) = 46.10 AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.55  
TOTAL AREA(ACRES) = 46.1 PEAK FLOW RATE(CFS) = 96.55

\*\*\*\*\*  
FLOW PROCESS FROM NODE 209.10 TO NODE 230.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 331.00 DOWNSTREAM(FEET) = 330.00  
FLOW LENGTH(FEET) = 205.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.87  
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 96.55  
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 16.71

LONGEST FLOWPATH FROM NODE 203.00 TO NODE 230.00 = 5525.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 230.00 TO NODE 230.00 IS CODE = 1  
-----

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

=====

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 16.71  
RAINFALL INTENSITY(INCH/HR) = 2.44  
AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.26  
AREA-AVERAGED Ap = 0.55  
EFFECTIVE STREAM AREA(ACRES) = 46.10  
TOTAL STREAM AREA(ACRES) = 46.10  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 96.55

\*\*\*\*\*  
FLOW PROCESS FROM NODE 210.00 TO NODE 211.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 328.00  
ELEVATION DATA: UPSTREAM(FEET) = 426.00 DOWNSTREAM(FEET) = 423.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.407  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.595  
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	B	0.50	0.30	0.200	56	8.41
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	C	1.20	0.25	0.200	69	8.41

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 5.42  
TOTAL AREA(ACRES) = 1.70 PEAK FLOW RATE(CFS) = 5.42

\*\*\*\*\*  
FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 423.00 DOWNSTREAM(FEET) = 421.00  
FLOW LENGTH(FEET) = 385.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.47  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 5.42  
PIPE TRAVEL TIME(MIN.) = 1.44 Tc(MIN.) = 9.84  
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 713.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 9.84  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.288  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	1.10	0.30	0.200	56
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	1.40	0.25	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	1.80	0.20	0.200	75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 4.30 SUBAREA RUNOFF(CFS) = 12.54  
 EFFECTIVE AREA(ACRES) = 6.00 AREA-AVERAGED Fm(INCH/HR) = 0.05  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 6.0 PEAK FLOW RATE(CFS) = 17.48

\*\*\*\*\*  
FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 421.00 DOWNSTREAM(FEET) = 415.00  
 FLOW LENGTH(FEET) = 567.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.79  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 17.48  
 PIPE TRAVEL TIME(MIN.) = 1.21 Tc(MIN.) = 11.06  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 1280.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 213.00 TO NODE 213.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 11.06  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.078  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	1.90	0.30	0.200	56
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	5.70	0.25	0.200	69

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 20.70  
 EFFECTIVE AREA(ACRES) = 13.60 AREA-AVERAGED Fm(INCH/HR) = 0.05  
 AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 13.6 PEAK FLOW RATE(CFS) = 37.05

\*\*\*\*\*  
FLOW PROCESS FROM NODE 213.00 TO NODE 214.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 415.00 DOWNSTREAM(FEET) = 409.00  
 FLOW LENGTH(FEET) = 747.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.45  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 37.05  
 PIPE TRAVEL TIME(MIN.) = 1.47 Tc(MIN.) = 12.53  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 214.00 = 2027.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 12.53  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.868  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.60	0.30	0.100	56
COMMERCIAL	C	0.30	0.25	0.100	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	0.20	0.25	0.200	69
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	2.90	0.30	0.400	56
RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	11.40	0.25	0.400	69
RESIDENTIAL "8-10 DWELLINGS/ACRE"	D	0.90	0.20	0.400	75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.381  
 SUBAREA AREA(ACRES) = 16.30 SUBAREA RUNOFF(CFS) = 40.64  
 EFFECTIVE AREA(ACRES) = 29.90 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.30  
 TOTAL AREA(ACRES) = 29.9 PEAK FLOW RATE(CFS) = 75.11

\*\*\*\*\*  
FLOW PROCESS FROM NODE 214.00 TO NODE 215.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 409.00 DOWNSTREAM(FEET) = 382.00  
 FLOW LENGTH(FEET) = 1002.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.72  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 75.11  
 PIPE TRAVEL TIME(MIN.) = 1.06 Tc(MIN.) = 13.59  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 215.00 = 3029.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*

MAINLINE Tc(MIN.) = 13.59  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.739  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.40	0.30	0.200	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	7.10	0.30	0.500	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	3.60	0.25	0.500	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	D	0.30	0.20	0.500	75
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	10.50	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	9.40	0.25	0.400	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.419  
 SUBAREA AREA(ACRES) = 33.30 SUBAREA RUNOFF(CFS) = 78.58  
 EFFECTIVE AREA(ACRES) = 63.20 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA(ACRES) = 63.2 PEAK FLOW RATE(CFS) = 150.22

\*\*\*\*\*

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*

MAINLINE Tc(MIN.) = 13.59  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.739  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	0.30	0.20	0.400	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400  
 SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.72  
 EFFECTIVE AREA(ACRES) = 63.50 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.36  
 TOTAL AREA(ACRES) = 63.5 PEAK FLOW RATE(CFS) = 150.94

\*\*\*\*\*

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

\*\*\*\*\*

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

ELEVATION DATA: UPSTREAM(FEET) = 382.00 DOWNSTREAM(FEET) = 373.00  
 FLOW LENGTH(FEET) = 1218.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.47  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 150.94  
 PIPE TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 15.36  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 218.00 = 4247.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 218.00 TO NODE 218.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*

MAINLINE Tc(MIN.) = 15.36  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.555  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	7.70	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	0.40	0.25	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	1.70	0.20	0.200	75
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.40	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.212  
 SUBAREA AREA(ACRES) = 10.20 SUBAREA RUNOFF(CFS) = 22.91  
 EFFECTIVE AREA(ACRES) = 73.70 AREA-AVERAGED Fm(INCH/HR) = 0.09  
 AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.34  
 TOTAL AREA(ACRES) = 73.7 PEAK FLOW RATE(CFS) = 163.37

\*\*\*\*\*

FLOW PROCESS FROM NODE 218.00 TO NODE 219.00 IS CODE = 31

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

\*\*\*\*\*

ELEVATION DATA: UPSTREAM(FEET) = 373.00 DOWNSTREAM(FEET) = 347.00  
 FLOW LENGTH(FEET) = 2106.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.23  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 163.37  
 PIPE TRAVEL TIME(MIN.) = 2.47 Tc(MIN.) = 17.83  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 219.00 = 6353.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

\*\*\*\*\*

MAINLINE Tc(MIN.) = 17.83  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.349  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.20	0.25	0.100	69
COMMERCIAL	D	2.40	0.20	0.100	75
PUBLIC PARK	B	1.20	0.30	0.850	56
PUBLIC PARK	C	1.70	0.25	0.850	69

PUBLIC PARK D 8.50 0.20 0.850 75  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" A 0.70 0.40 0.200 32  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.686  
 SUBAREA AREA (ACRES) = 14.70 SUBAREA RUNOFF(CFS) = 29.08  
 EFFECTIVE AREA (ACRES) = 88.40 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA (ACRES) = 88.4 PEAK FLOW RATE (CFS) = 178.75

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 17.83  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.349  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" B 2.90 0.30 0.200 56  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 2.90 0.25 0.200 69  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" D 24.00 0.20 0.200 75  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" D 0.10 0.20 0.900 75  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" B 0.20 0.30 0.500 56  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 0.10 0.25 0.500 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.205  
 SUBAREA AREA (ACRES) = 30.20 SUBAREA RUNOFF(CFS) = 62.64  
 EFFECTIVE AREA (ACRES) = 118.60 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.35  
 TOTAL AREA (ACRES) = 118.6 PEAK FLOW RATE (CFS) = 241.38

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 17.83  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.349  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "8-10 DWELLINGS/ACRE" B 0.50 0.30 0.400 56  
 RESIDENTIAL  
 "8-10 DWELLINGS/ACRE" C 1.40 0.25 0.400 69  
 RESIDENTIAL  
 "8-10 DWELLINGS/ACRE" D 7.40 0.20 0.400 75  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400  
 SUBAREA AREA (ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 18.95

EFFECTIVE AREA (ACRES) = 127.90 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.35  
 TOTAL AREA (ACRES) = 127.9 PEAK FLOW RATE (CFS) = 260.33

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 219.00 TO NODE 230.00 IS CODE = 31  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 347.00 DOWNSTREAM(FEET) = 330.00  
 FLOW LENGTH(FEET) = 1244.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.6 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.65  
 ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 260.33  
 PIPE TRAVEL TIME(MIN.) = 1.25 Tc(MIN.) = 19.07  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 230.00 = 7597.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 230.00 TO NODE 230.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 19.07  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.261  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL B 3.20 0.30 0.100 56  
 COMMERCIAL D 0.70 0.20 0.100 75  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" B 0.90 0.30 0.200 56  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" D 0.30 0.20 0.200 75  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.124  
 SUBAREA AREA (ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 10.22  
 EFFECTIVE AREA (ACRES) = 133.00 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.34  
 TOTAL AREA (ACRES) = 133.0 PEAK FLOW RATE (CFS) = 260.41

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 230.00 TO NODE 230.00 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.) = 19.07  
 RAINFALL INTENSITY(INCH/HR) = 2.26  
 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.25  
 AREA-AVERAGED Ap = 0.34  
 EFFECTIVE STREAM AREA (ACRES) = 133.00  
 TOTAL STREAM AREA (ACRES) = 133.00  
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 260.41



TOTAL AREA (ACRES) = 213.7 TC (MIN.) = 19.25  
 EFFECTIVE AREA (ACRES) = 213.70 AREA-AVERAGED Fm (INCH/HR) = 0.11  
 AREA-AVERAGED Fp (INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.427  
 PEAK FLOW RATE (CFS) = 411.35

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	409.98	16.89	2.422	0.26 ( 0.11)	0.43	197.2	203.00
2	411.35	19.25	2.249	0.26 ( 0.11)	0.43	213.7	210.00

=====  
 END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
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Ver. 20.0 Release Date: 06/01/2013 License ID 1237

Analysis prepared by:

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* RMV PA-3 BODR 2022 - SUBWATERSHED C \*  
\* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
\* 100-YR HC SEPT 2022 ROKAMOTO \*  
\*\*\*\*\*

FILE NAME: PA3C00HC.DAT  
TIME/DATE OF STUDY: 19:22 09/17/2022

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*DATA BANK RAINFALL USED\*  
\*ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD\*

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150
2	32.0	27.0	0.200/0.200/ ---	0.67	2.00 0.0312 0.167	0.0150
3	13.0	8.0	0.200/0.200/ ---	0.33	1.00 0.3120 0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00  
ELEVATION DATA: UPSTREAM(FEET) = 644.00 DOWNSTREAM(FEET) = 641.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.438  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.584  
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	D	1.60	0.20	0.200	91	8.44

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA RUNOFF(CFS) = 6.54  
TOTAL AREA(ACRES) = 1.60 PEAK FLOW RATE(CFS) = 6.54

\*\*\*\*\*  
FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 62  
-----

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

=====

UPSTREAM ELEVATION(FEET) = 641.00 DOWNSTREAM ELEVATION(FEET) = 637.00  
STREET LENGTH(FEET) = 470.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.13

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.46  
HALFSTREET FLOOD WIDTH(FEET) = 16.68  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.64  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.21  
STREET FLOW TRAVEL TIME(MIN.) = 2.97 Tc(MIN.) = 11.41

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.857  
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.10	0.20	0.100	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	4.30	0.20	0.200	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.198  
SUBAREA AREA(ACRES) = 4.40 SUBAREA RUNOFF(CFS) = 15.12  
EFFECTIVE AREA(ACRES) = 6.00 AREA-AVERAGED Fm(INCH/HR) = 0.04  
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20  
TOTAL AREA(ACRES) = 6.0 PEAK FLOW RATE(CFS) = 20.61

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 19.41  
FLOW VELOCITY(FEET/SEC.) = 2.90 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.47  
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 800.00 FEET.

```
*****
FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 637.00 DOWNSTREAM(FEET) = 634.00
FLOW LENGTH(FEET) = 563.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.14
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.61
PIPE TRAVEL TIME(MIN.) = 1.53 Tc(MIN.) = 12.93
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1363.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81
-----
```

```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 12.93
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.589
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 5.60 0.25 0.200 86
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.40 0.20 0.200 91
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 25.50
EFFECTIVE AREA(ACRES) = 14.00 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 14.0 PEAK FLOW RATE(CFS) = 44.67
```

```
*****
FLOW PROCESS FROM NODE 303.00 TO NODE 304.00 IS CODE = 31
-----
```

```
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 634.00 DOWNSTREAM(FEET) = 630.00
FLOW LENGTH(FEET) = 1072.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.55
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 44.67
PIPE TRAVEL TIME(MIN.) = 2.73 Tc(MIN.) = 15.66
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 304.00 = 2435.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 304.00 TO NODE 304.00 IS CODE = 81
-----
```

```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 15.66
```

```
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.217
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 2.90 0.25 0.100 86
COMMERCIAL D 4.50 0.20 0.100 91
PUBLIC PARK D 0.10 0.20 0.850 91
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 5.70 0.25 0.200 86
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.40 0.20 0.200 91
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C 0.50 0.25 0.400 86
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.164
SUBAREA AREA(ACRES) = 16.10 SUBAREA RUNOFF(CFS) = 46.06
EFFECTIVE AREA(ACRES) = 30.10 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 30.1 PEAK FLOW RATE(CFS) = 86.03
```

```
*****
FLOW PROCESS FROM NODE 304.00 TO NODE 304.00 IS CODE = 81
-----
```

```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
MAINLINE Tc(MIN.) = 15.66
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.217
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
SCHOOL C 5.70 0.25 0.600 86
SCHOOL D 6.70 0.20 0.600 91
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 12.40 SUBAREA RUNOFF(CFS) = 34.40
EFFECTIVE AREA(ACRES) = 42.50 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 42.5 PEAK FLOW RATE(CFS) = 120.44
```

```
*****
FLOW PROCESS FROM NODE 304.00 TO NODE 305.00 IS CODE = 31
-----
```

```
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 630.00 DOWNSTREAM(FEET) = 610.00
FLOW LENGTH(FEET) = 1290.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.50
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 120.44
PIPE TRAVEL TIME(MIN.) = 1.48 Tc(MIN.) = 17.14
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 305.00 = 3725.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81
-----
```

```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```

=====
MAINLINE Tc(MIN.) = 17.14
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.054
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              C       1.00     0.25     0.100     86
COMMERCIAL              D       0.90     0.20     0.100     91
RESIDENTIAL
"11+ DWELLINGS/ACRE"   C       0.60     0.25     0.200     86
RESIDENTIAL
"11+ DWELLINGS/ACRE"   D       0.10     0.20     0.200     91
SCHOOL                  C       0.10     0.25     0.600     86
SCHOOL                  D       0.50     0.20     0.600     91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.216
SUBAREA AREA(ACRES) = 3.20      SUBAREA RUNOFF(CFS) = 8.66
EFFECTIVE AREA(ACRES) = 45.70   AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22  AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 45.7        PEAK FLOW RATE(CFS) = 122.88

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```

*****
FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 82
-----

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```

>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
-----

```

```

INITIAL SUBAREA FLOW-LENGTH(FEET) = 3668.00
ELEVATION DATA: UPSTREAM(FEET) = 663.00  DOWNSTREAM(FEET) = 610.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 18.909
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.887
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS  Tc
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL              C       1.70     0.25     0.100     86  18.91
COMMERCIAL              D       4.40     0.20     0.100     91  18.91
RESIDENTIAL
"11+ DWELLINGS/ACRE"   C       0.60     0.25     0.200     86  20.15
RESIDENTIAL
"11+ DWELLINGS/ACRE"   D       1.30     0.20     0.200     91  20.15
RESIDENTIAL
"3-4 DWELLINGS/ACRE"   D       7.10     0.20     0.600     91  25.63
RESIDENTIAL
"3-4 DWELLINGS/ACRE"   C       2.80     0.25     0.600     86  25.63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.387
SUBAREA AREA(ACRES) = 17.90      INITIAL SUBAREA RUNOFF(CFS) = 45.18

```

```

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN.) = 17.14
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.054
SUBAREA AREA(ACRES) = 17.90      SUBAREA RUNOFF(CFS) = 47.86
EFFECTIVE AREA(ACRES) = 63.60   AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22  AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 63.6        PEAK FLOW RATE(CFS) = 170.74

```

```

*****
FLOW PROCESS FROM NODE 305.00 TO NODE 317.00 IS CODE = 31
-----

```

```

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

```

```

ELEVATION DATA: UPSTREAM(FEET) = 610.00  DOWNSTREAM(FEET) = 535.00
FLOW LENGTH(FEET) = 1537.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.78
ESTIMATED PIPE DIAMETER(INCH) = 39.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 170.74
PIPE TRAVEL TIME(MIN.) = 1.08  Tc(MIN.) = 18.22
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 317.00 = 5262.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 317.00 TO NODE 317.00 IS CODE = 81
-----

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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----

```

```

MAINLINE Tc(MIN.) = 18.22
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.949
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap        SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL              C       3.30     0.25     0.100     86
COMMERCIAL              D       0.40     0.20     0.100     91
PUBLIC PARK             C       0.10     0.25     0.850     86
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C       0.20     0.25     0.500     86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.139
SUBAREA AREA(ACRES) = 4.00      SUBAREA RUNOFF(CFS) = 10.49
EFFECTIVE AREA(ACRES) = 67.60   AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22  AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 67.6        PEAK FLOW RATE(CFS) = 175.24

```

```

*****
FLOW PROCESS FROM NODE 317.00 TO NODE 317.00 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.) = 18.22
RAINFALL INTENSITY(INCH/HR) = 2.95
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA(ACRES) = 67.60
TOTAL STREAM AREA(ACRES) = 67.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 175.24

```

```

*****
FLOW PROCESS FROM NODE 310.00 TO NODE 311.00 IS CODE = 21
-----

```

```

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

```

=====
INITIAL SUBAREA FLOW-LENGTH (FEET) = 330.00
ELEVATION DATA: UPSTREAM (FEET) = 629.00 DOWNSTREAM (FEET) = 625.00

Tc = K \* [(LENGTH\*\* 3.00) / (ELEVATION CHANGE)] \*\* 0.20

SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 7.474

\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.914

SUBAREA Tc AND LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.10 0.20 0.100 91 7.47

RESIDENTIAL
"11+ DWELLINGS/ACRE" C 1.10 0.25 0.200 86 7.97

RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.20 0.20 0.200 91 7.97

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.193

SUBAREA RUNOFF (CFS) = 6.13

TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 6.13

\*\*\*\*\*
FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 IS CODE = 62

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

>>>> (STREET TABLE SECTION # 1 USED) <<<<<

UPSTREAM ELEVATION (FEET) = 625.00 DOWNSTREAM ELEVATION (FEET) = 623.00
STREET LENGTH (FEET) = 300.00 CURB HEIGHT (INCHES) = 8.0
STREET HALFWIDTH (FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00

INSIDE STREET CROSSFALL (DECIMAL) = 0.018

OUTSIDE STREET CROSSFALL (DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL (DECIMAL) = 0.020

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

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 11.64

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.45

HALFSTREET FLOOD WIDTH (FEET) = 16.13

AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.31

PRODUCT OF DEPTH&VELOCITY (FT\*FT/SEC.) = 1.04

STREET FLOW TRAVEL TIME (MIN.) = 2.16 Tc (MIN.) = 9.64

\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.248

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.50 0.25 0.100 86

COMMERCIAL D 0.20 0.20 0.100 91

RESIDENTIAL

"11+ DWELLINGS/ACRE" C 0.70 0.25 0.200 86

RESIDENTIAL

"11+ DWELLINGS/ACRE" D 0.50 0.20 0.200 91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.141

SUBAREA AREA (ACRES) = 2.90 SUBAREA RUNOFF (CFS) = 11.00
EFFECTIVE AREA (ACRES) = 4.30 AREA-AVERAGED Fm (INCH/HR) = 0.04
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.16
TOTAL AREA (ACRES) = 4.3 PEAK FLOW RATE (CFS) = 16.29

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.49 HALFSTREET FLOOD WIDTH (FEET) = 18.55

FLOW VELOCITY (FEET/SEC.) = 2.49 DEPTH\*VELOCITY (FT\*FT/SEC.) = 1.23

LONGEST FLOWPATH FROM NODE 310.00 TO NODE 312.00 = 630.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 312.00 TO NODE 313.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 623.00 DOWNSTREAM (FEET) = 620.00

FLOW LENGTH (FEET) = 369.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.9 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 6.90

ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 16.29

PIPE TRAVEL TIME (MIN.) = 0.89 Tc (MIN.) = 10.53

LONGEST FLOWPATH FROM NODE 310.00 TO NODE 313.00 = 999.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 313.00 TO NODE 313.00 IS CODE = 81

>>>> ADDITION OF SUBAREA TO MAINLINE PEAK FLOW <<<<<

MAINLINE Tc (MIN.) = 10.53

\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.038

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.90 0.25 0.100 86

COMMERCIAL D 2.50 0.20 0.100 91

RESIDENTIAL

"11+ DWELLINGS/ACRE" C 0.80 0.25 0.200 86

RESIDENTIAL

"11+ DWELLINGS/ACRE" D 0.70 0.20 0.200 91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.22

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.125

SUBAREA AREA (ACRES) = 5.90 SUBAREA RUNOFF (CFS) = 21.29

EFFECTIVE AREA (ACRES) = 10.20 AREA-AVERAGED Fm (INCH/HR) = 0.03

AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.14

TOTAL AREA (ACRES) = 10.2 PEAK FLOW RATE (CFS) = 36.78

\*\*\*\*\*
FLOW PROCESS FROM NODE 313.00 TO NODE 314.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 620.00 DOWNSTREAM (FEET) = 615.00

FLOW LENGTH (FEET) = 338.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.9 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 10.66

ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 36.78  
PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 11.06  
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 314.00 = 1337.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 314.00 TO NODE 314.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 11.06  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.926  
SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.20 0.25 0.100 86  
COMMERCIAL D 0.10 0.20 0.100 91  
PUBLIC PARK C 0.20 0.25 0.850 86  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 6.10 0.25 0.200 86  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" D 6.10 0.20 0.200 91  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.208  
SUBAREA AREA(ACRES) = 12.70 SUBAREA RUNOFF(CFS) = 44.34  
EFFECTIVE AREA(ACRES) = 22.90 AREA-AVERAGED Fm(INCH/HR) = 0.04  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.18  
TOTAL AREA(ACRES) = 22.9 PEAK FLOW RATE(CFS) = 80.09

\*\*\*\*\*  
FLOW PROCESS FROM NODE 314.00 TO NODE 315.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 615.00 DOWNSTREAM(FEET) = 600.00  
FLOW LENGTH(FEET) = 578.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.51  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 80.09  
PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 11.68  
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 315.00 = 1915.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 315.00 TO NODE 315.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 11.68  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.805  
SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 1.70 0.25 0.100 86  
COMMERCIAL D 1.30 0.20 0.100 91  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 3.00 0.25 0.200 86

RESIDENTIAL  
"11+ DWELLINGS/ACRE" D 2.10 0.20 0.200 91  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 3.70 0.25 0.500 86  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" D 6.00 0.20 0.500 91  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.347  
SUBAREA AREA(ACRES) = 17.80 SUBAREA RUNOFF(CFS) = 59.74  
EFFECTIVE AREA(ACRES) = 40.70 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.25  
TOTAL AREA(ACRES) = 40.7 PEAK FLOW RATE(CFS) = 137.33

\*\*\*\*\*  
FLOW PROCESS FROM NODE 315.00 TO NODE 316.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 600.00 DOWNSTREAM(FEET) = 569.00  
FLOW LENGTH(FEET) = 2176.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 48.0 INCH PIPE IS 33.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.51  
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 137.33  
PIPE TRAVEL TIME(MIN.) = 2.50 Tc(MIN.) = 14.18  
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 316.00 = 4091.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 316.00 TO NODE 316.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 14.18  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.405  
SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 0.40 0.25 0.200 86  
RESIDENTIAL  
".4 DWELLING/ACRE" D 0.30 0.20 0.900 91  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 6.80 0.25 0.500 86  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" D 19.10 0.20 0.500 91  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 26.60 SUBAREA RUNOFF(CFS) = 78.97  
EFFECTIVE AREA(ACRES) = 67.30 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 67.3 PEAK FLOW RATE(CFS) = 201.65

\*\*\*\*\*  
FLOW PROCESS FROM NODE 316.00 TO NODE 317.00 IS CODE = 31  
-----

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

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 569.00 DOWNSTREAM(FEET) = 535.00
FLOW LENGTH(FEET) = 759.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 34.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.94
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 201.65
PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 14.71
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 317.00 = 4850.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 317.00 TO NODE 317.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 14.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.335
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           C      0.40    0.25   0.100  86
COMMERCIAL           D      0.10    0.20   0.100  91
RESIDENTIAL
".4 DWELLING/ACRE"   C      0.70    0.25   0.900  86
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C      8.90    0.25   0.500  86
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D      7.40    0.20   0.500  91
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.505
SUBAREA AREA(ACRES) = 17.50 SUBAREA RUNOFF(CFS) = 50.70
EFFECTIVE AREA(ACRES) = 84.80 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 84.8 PEAK FLOW RATE(CFS) = 248.07

```

```

*****
FLOW PROCESS FROM NODE 317.00 TO NODE 317.00 IS CODE = 1
-----

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

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```

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 14.71
RAINFALL INTENSITY(INCH/HR) = 3.33
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.38
EFFECTIVE STREAM AREA(ACRES) = 84.80
TOTAL STREAM AREA(ACRES) = 84.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 248.07

```

```

** CONFLUENCE DATA **
STREAM    Q    Tc  Intensity  Fp(Fm)  Ap    Ae  HEADWATER
NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1       175.24 18.22 2.949 0.22( 0.07) 0.31 67.6 300.00
2       248.07 14.71 3.335 0.22( 0.08) 0.38 84.8 310.00

```

```

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

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```

** PEAK FLOW RATE TABLE **
STREAM    Q    Tc  Intensity  Fp(Fm)  Ap    Ae  HEADWATER
NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1       408.42 14.71 3.335 0.22( 0.08) 0.35 139.4 310.00
2       393.89 18.22 2.949 0.22( 0.08) 0.35 152.4 300.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 408.42 Tc(MIN.) = 14.71
EFFECTIVE AREA(ACRES) = 139.36 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 152.4
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 317.00 = 5262.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 317.00 TO NODE 307.00 IS CODE = 31
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```

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

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```

ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 374.00
FLOW LENGTH(FEET) = 3798.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.41
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 408.42
PIPE TRAVEL TIME(MIN.) = 2.23 Tc(MIN.) = 16.93
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 307.00 = 9060.00 FEET.

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*****
FLOW PROCESS FROM NODE 307.00 TO NODE 307.00 IS CODE = 81
-----

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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

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MAINLINE Tc(MIN.) = 16.93
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.076
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS           C      0.10    0.25   0.200  86
COMMERCIAL            A      1.40    0.40   0.100  52
COMMERCIAL            B      4.80    0.30   0.100  76
COMMERCIAL            C      5.00    0.25   0.100  86
COMMERCIAL            D      3.70    0.20   0.100  91
PUBLIC PARK           D      5.00    0.20   0.850  91
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.288
SUBAREA AREA(ACRES) = 20.00 SUBAREA RUNOFF(CFS) = 54.23
EFFECTIVE AREA(ACRES) = 159.36 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 172.4 PEAK FLOW RATE(CFS) = 430.17

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```

*****
FLOW PROCESS FROM NODE 307.00 TO NODE 307.00 IS CODE = 81
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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

```

```

=====
MAINLINE Tc(MIN.) = 16.93
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.076
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA     Fp       Ap       SCS
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"   C       4.00    0.25    0.200    86
RESIDENTIAL
"11+ DWELLINGS/ACRE"   D      12.70    0.20    0.200    91
RESIDENTIAL
".4 DWELLING/ACRE"     B       1.10    0.30    0.900    76
RESIDENTIAL
".4 DWELLING/ACRE"     C       1.50    0.25    0.900    86
RESIDENTIAL
".4 DWELLING/ACRE"     D       2.50    0.20    0.900    91
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   B       0.10    0.30    0.500    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.364
SUBAREA AREA(ACRES) = 21.90      SUBAREA RUNOFF(CFS) = 58.99
EFFECTIVE AREA(ACRES) = 181.26  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22  AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 194.3      PEAK FLOW RATE(CFS) = 489.17

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*****
FLOW PROCESS FROM NODE 307.00 TO NODE 307.00 IS CODE = 81
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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

MAINLINE Tc(MIN.) = 16.93
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.076
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA     Fp       Ap       SCS
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   C       4.50    0.25    0.500    86
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   D       1.40    0.20    0.500    91
SCHOOL                B       2.20    0.30    0.600    76
SCHOOL                C       6.80    0.25    0.600    86
SCHOOL                D       7.90    0.20    0.600    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.574
SUBAREA AREA(ACRES) = 22.80      SUBAREA RUNOFF(CFS) = 60.35
EFFECTIVE AREA(ACRES) = 204.06  AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22  AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 217.1      PEAK FLOW RATE(CFS) = 549.52

```

```

*****
FLOW PROCESS FROM NODE 307.00 TO NODE 330.00 IS CODE = 31
-----

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```

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

```

```

ELEVATION DATA: UPSTREAM(FEET) = 374.00 DOWNSTREAM(FEET) = 310.00
FLOW LENGTH(FEET) = 847.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.4 INCHES

```

```

PIPE-FLOW VELOCITY(FEET/SEC.) = 37.96
ESTIMATED PIPE DIAMETER(INCH) = 57.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 549.52
PIPE TRAVEL TIME(MIN.) = 0.37      Tc(MIN.) = 17.31
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 330.00 = 9907.00 FEET.

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*****
FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 1
-----

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```

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

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```

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 17.31
RAINFALL INTENSITY(INCH/HR) = 3.04
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.37
EFFECTIVE STREAM AREA(ACRES) = 204.06
TOTAL STREAM AREA(ACRES) = 217.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 549.52

```

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*****
FLOW PROCESS FROM NODE 320.00 TO NODE 321.00 IS CODE = 21
-----

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```

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----

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```

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 636.00 DOWNSTREAM(FEET) = 633.00

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```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.438
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.584
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA     Fp       Ap       SCS   Tc
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"   C       2.80    0.25    0.200    86   8.44
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 11.43
TOTAL AREA(ACRES) = 2.80      PEAK FLOW RATE(CFS) = 11.43

```

```

*****
FLOW PROCESS FROM NODE 321.00 TO NODE 322.00 IS CODE = 62
-----

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```

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

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```

UPSTREAM ELEVATION(FEET) = 633.00 DOWNSTREAM ELEVATION(FEET) = 628.00
STREET LENGTH(FEET) = 360.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

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```

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

```

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.85  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH( FEET) = 0.50  
HALFSTREET FLOOD WIDTH( FEET) = 18.95  
AVERAGE FLOW VELOCITY( FEET/SEC.) = 3.66  
PRODUCT OF DEPTH&VELOCITY( FT\*FT/SEC.) = 1.83  
STREET FLOW TRAVEL TIME( MIN.) = 1.64 Tc( MIN.) = 10.08  
\* 100 YEAR RAINFALL INTENSITY( INCH/HR) = 4.140

SUBAREA LOSS RATE DATA( AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.10	0.20	0.100	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	6.30	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.20	0.20	0.200	91
SCHOOL	C	0.70	0.25	0.600	86

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp( INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.237  
SUBAREA AREA( ACRES) = 7.30 SUBAREA RUNOFF( CFS) = 26.82  
EFFECTIVE AREA( ACRES) = 10.10 AREA-AVERAGED Fm( INCH/HR) = 0.06  
AREA-AVERAGED Fp( INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.23  
TOTAL AREA( ACRES) = 10.1 PEAK FLOW RATE( CFS) = 37.12

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH( FEET) = 0.56 HALFSTREET FLOOD WIDTH( FEET) = 22.23  
FLOW VELOCITY( FEET/SEC.) = 4.03 DEPTH\*VELOCITY( FT\*FT/SEC.) = 2.26  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 322.00 = 690.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 322.00 TO NODE 323.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM( FEET) = 628.00 DOWNSTREAM( FEET) = 624.00  
FLOW LENGTH( FEET) = 750.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.4 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC.) = 7.27  
ESTIMATED PIPE DIAMETER( INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 37.12  
PIPE TRAVEL TIME( MIN.) = 1.72 Tc( MIN.) = 11.80  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 323.00 = 1440.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 323.00 TO NODE 323.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc( MIN.) = 11.80  
\* 100 YEAR RAINFALL INTENSITY( INCH/HR) = 3.783  
SUBAREA LOSS RATE DATA( AMC III):

DEVELOPMENT TYPE/ SCS SOIL	AREA	Fp	Ap	SCS
-------------------------------	------	----	----	-----

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
PUBLIC PARK	C	2.00	0.25	0.850	86
PUBLIC PARK	D	2.10	0.20	0.850	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	5.60	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.90	0.20	0.200	91
SCHOOL	C	3.10	0.25	0.600	86
SCHOOL	D	0.30	0.20	0.600	91
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp( INCH/HR) = 0.23					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.488					
SUBAREA AREA( ACRES) = 14.00		SUBAREA RUNOFF( CFS) = 46.23			
EFFECTIVE AREA( ACRES) = 24.10		AREA-AVERAGED Fm( INCH/HR) = 0.09			
AREA-AVERAGED Fp( INCH/HR) = 0.24		AREA-AVERAGED Ap = 0.38			
TOTAL AREA( ACRES) = 24.1		PEAK FLOW RATE( CFS) = 80.10			

\*\*\*\*\*  
FLOW PROCESS FROM NODE 323.00 TO NODE 323.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc( MIN.) = 11.80  
\* 100 YEAR RAINFALL INTENSITY( INCH/HR) = 3.783  
SUBAREA LOSS RATE DATA( AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	C	0.10	0.25	0.200	86
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp( INCH/HR) = 0.25					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA( ACRES) = 0.10		SUBAREA RUNOFF( CFS) = 0.34			
EFFECTIVE AREA( ACRES) = 24.20		AREA-AVERAGED Fm( INCH/HR) = 0.09			
AREA-AVERAGED Fp( INCH/HR) = 0.24		AREA-AVERAGED Ap = 0.38			
TOTAL AREA( ACRES) = 24.2		PEAK FLOW RATE( CFS) = 80.44			

\*\*\*\*\*  
FLOW PROCESS FROM NODE 323.00 TO NODE 324.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM( FEET) = 624.00 DOWNSTREAM( FEET) = 614.00  
FLOW LENGTH( FEET) = 887.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.9 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC.) = 11.42  
ESTIMATED PIPE DIAMETER( INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 80.44  
PIPE TRAVEL TIME( MIN.) = 1.29 Tc( MIN.) = 13.09  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 324.00 = 2327.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc( MIN.) = 13.09  
\* 100 YEAR RAINFALL INTENSITY( INCH/HR) = 3.564  
SUBAREA LOSS RATE DATA( AMC III):

DEVELOPMENT TYPE/ SCS SOIL	AREA	Fp	Ap	SCS
-------------------------------	------	----	----	-----

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	C	1.10	0.25	0.100	86
COMMERCIAL	D	1.10	0.20	0.100	91
PUBLIC PARK	C	3.10	0.25	0.850	86
PUBLIC PARK	D	2.60	0.20	0.850	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	4.80	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	3.40	0.20	0.200	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.416  
SUBAREA AREA (ACRES) = 16.10 SUBAREA RUNOFF (CFS) = 50.27  
EFFECTIVE AREA (ACRES) = 40.30 AREA-AVERAGED Fm (INCH/HR) = 0.09  
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.39  
TOTAL AREA (ACRES) = 40.3 PEAK FLOW RATE (CFS) = 125.94

\*\*\*\*\*

FLOW PROCESS FROM NODE 324.00 TO NODE 325.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 614.00 DOWNSTREAM(FEET) = 571.00  
FLOW LENGTH(FEET) = 1805.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.9 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.20  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 125.94  
PIPE TRAVEL TIME(MIN.) = 1.75 Tc(MIN.) = 14.84  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 325.00 = 4132.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 14.84  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.317  
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	3.10	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	5.00	0.20	0.200	91
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.20	0.25	0.900	86
RESIDENTIAL					
".4 DWELLING/ACRE"	D	1.20	0.20	0.900	91
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	13.90	0.25	0.500	86
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	D	18.60	0.20	0.500	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455  
SUBAREA AREA (ACRES) = 42.00 SUBAREA RUNOFF (CFS) = 121.59  
EFFECTIVE AREA (ACRES) = 82.30 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.42

TOTAL AREA (ACRES) = 82.3 PEAK FLOW RATE (CFS) = 238.57

\*\*\*\*\*

FLOW PROCESS FROM NODE 325.00 TO NODE 326.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 571.00 DOWNSTREAM(FEET) = 497.00  
FLOW LENGTH(FEET) = 1090.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 33.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 29.43  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 238.57  
PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 15.46  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 326.00 = 5222.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 15.46  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.240  
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.00	0.30	0.100	76
COMMERCIAL	C	6.10	0.25	0.100	86
COMMERCIAL	D	12.90	0.20	0.100	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.30	0.20	0.200	91
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.90	0.30	0.900	76
RESIDENTIAL					
".4 DWELLING/ACRE"	C	12.80	0.25	0.900	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.423  
SUBAREA AREA (ACRES) = 34.00 SUBAREA RUNOFF (CFS) = 95.94  
EFFECTIVE AREA (ACRES) = 116.30 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.42  
TOTAL AREA (ACRES) = 116.3 PEAK FLOW RATE (CFS) = 328.84

\*\*\*\*\*

FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 15.46  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.240  
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	D	23.20	0.20	0.900	91
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	0.30	0.25	0.500	86
RESIDENTIAL					

"5-7 DWELLINGS/ACRE" D 0.30 0.20 0.500 91  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.890  
 SUBAREA AREA (ACRES) = 23.80 SUBAREA RUNOFF (CFS) = 65.59  
 EFFECTIVE AREA (ACRES) = 140.10 AREA-AVERAGED Fm (INCH/HR) = 0.11  
 AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA (ACRES) = 140.1 PEAK FLOW RATE (CFS) = 394.43

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 326.00 TO NODE 327.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 497.00 DOWNSTREAM (FEET) = 445.00  
 FLOW LENGTH (FEET) = 1732.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 45.4 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 24.74  
 ESTIMATED PIPE DIAMETER (INCH) = 60.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 394.43  
 PIPE TRAVEL TIME (MIN.) = 1.17 Tc (MIN.) = 16.63  
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 327.00 = 6954.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 327.00 TO NODE 327.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 16.63  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.108  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	4.80	0.25	0.100	86
COMMERCIAL	D	4.80	0.20	0.100	91
PUBLIC PARK	C	0.10	0.25	0.850	86
PUBLIC PARK	D	6.30	0.20	0.850	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.00	0.30	0.200	76
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	43.30	0.25	0.200	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.250  
 SUBAREA AREA (ACRES) = 64.30 SUBAREA RUNOFF (CFS) = 176.47  
 EFFECTIVE AREA (ACRES) = 204.40 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA (ACRES) = 204.4 PEAK FLOW RATE (CFS) = 554.21

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 327.00 TO NODE 327.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 16.63  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.108  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	4.80	0.25	0.100	86
COMMERCIAL	D	4.80	0.20	0.100	91
PUBLIC PARK	C	0.10	0.25	0.850	86
PUBLIC PARK	D	6.30	0.20	0.850	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.00	0.30	0.200	76
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	43.30	0.25	0.200	86

RESIDENTIAL  
 "11+ DWELLINGS/ACRE" D 38.70 0.20 0.200 91  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" C 2.30 0.25 0.900 86  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" D 3.60 0.20 0.900 91  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.21  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.293  
 SUBAREA AREA (ACRES) = 44.60 SUBAREA RUNOFF (CFS) = 122.32  
 EFFECTIVE AREA (ACRES) = 249.00 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA (ACRES) = 249.0 PEAK FLOW RATE (CFS) = 676.53

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 327.00 TO NODE 328.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 445.00 DOWNSTREAM (FEET) = 338.00  
 FLOW LENGTH (FEET) = 2664.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 69.0 INCH PIPE IS 53.2 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 31.48  
 ESTIMATED PIPE DIAMETER (INCH) = 69.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 676.53  
 PIPE TRAVEL TIME (MIN.) = 1.41 Tc (MIN.) = 18.04  
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 328.00 = 9618.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 328.00 TO NODE 328.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 18.04  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 2.966  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	A	0.50	0.40	0.200	52
APARTMENTS	B	14.80	0.30	0.200	76
APARTMENTS	C	1.90	0.25	0.200	86
APARTMENTS	D	9.90	0.20	0.200	91
COMMERCIAL	A	1.80	0.40	0.100	52
COMMERCIAL	B	8.40	0.30	0.100	76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.27  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.173  
 SUBAREA AREA (ACRES) = 37.30 SUBAREA RUNOFF (CFS) = 98.01  
 EFFECTIVE AREA (ACRES) = 286.30 AREA-AVERAGED Fm (INCH/HR) = 0.08  
 AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA (ACRES) = 286.3 PEAK FLOW RATE (CFS) = 742.79

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 328.00 TO NODE 328.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 18.04  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 2.966

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	7.60	0.25	0.100	86
COMMERCIAL	D	14.00	0.20	0.100	91
PUBLIC PARK	C	1.40	0.25	0.850	86
PUBLIC PARK	D	0.30	0.20	0.850	91
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	0.20	0.40	0.200	52
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.30	0.30	0.200	76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.156  
SUBAREA AREA(ACRES) = 23.80 SUBAREA RUNOFF(CFS) = 62.77  
EFFECTIVE AREA(ACRES) = 310.10 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 310.1 PEAK FLOW RATE(CFS) = 805.57

\*\*\*\*\*  
FLOW PROCESS FROM NODE 328.00 TO NODE 328.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 18.04  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.966

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	12.20	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	17.60	0.20	0.200	91
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	76
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.90	0.25	0.900	86
RESIDENTIAL					
".4 DWELLING/ACRE"	D	9.30	0.20	0.900	91
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.20	0.30	0.500	76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.383  
SUBAREA AREA(ACRES) = 40.50 SUBAREA RUNOFF(CFS) = 105.15  
EFFECTIVE AREA(ACRES) = 350.60 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.36  
TOTAL AREA(ACRES) = 350.6 PEAK FLOW RATE(CFS) = 910.72

\*\*\*\*\*  
FLOW PROCESS FROM NODE 328.00 TO NODE 328.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 18.04  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.966

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					

"5-7 DWELLINGS/ACRE"	C	5.30	0.25	0.500	86
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	D	28.30	0.20	0.500	91
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	3.80	0.25	0.400	86
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	4.10	0.20	0.400	91
SCHOOL	C	0.30	0.25	0.600	86
SCHOOL	D	0.30	0.20	0.600	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.483  
SUBAREA AREA(ACRES) = 42.10 SUBAREA RUNOFF(CFS) = 108.54  
EFFECTIVE AREA(ACRES) = 392.70 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 392.7 PEAK FLOW RATE(CFS) = 1019.27

\*\*\*\*\*  
FLOW PROCESS FROM NODE 328.00 TO NODE 329.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 338.00 DOWNSTREAM(FEET) = 320.00  
FLOW LENGTH(FEET) = 1154.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 96.0 INCH PIPE IS 74.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.45  
ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 1019.27  
PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 18.82  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 329.00 = 10772.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 329.00 TO NODE 329.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 18.82  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.895

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	11.60	0.40	0.100	52
COMMERCIAL	B	6.70	0.30	0.100	76
COMMERCIAL	C	12.80	0.25	0.100	86
RESIDENTIAL					
".4 DWELLING/ACRE"	A	0.20	0.40	0.900	52
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.32  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.110  
SUBAREA AREA(ACRES) = 31.50 SUBAREA RUNOFF(CFS) = 81.07  
EFFECTIVE AREA(ACRES) = 424.20 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 424.2 PEAK FLOW RATE(CFS) = 1075.00

\*\*\*\*\*  
FLOW PROCESS FROM NODE 329.00 TO NODE 330.00 IS CODE = 31  
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 320.00 DOWNSTREAM(FEET) = 310.00
FLOW LENGTH(FEET) = 1981.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 120.0 INCH PIPE IS 94.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.17
ESTIMATED PIPE DIAMETER(INCH) = 120.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1075.00
PIPE TRAVEL TIME(MIN.) = 2.04 Tc(MIN.) = 20.87
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 330.00 = 12753.00 FEET.

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*****
FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 20.87
RAINFALL INTENSITY(INCH/HR) = 2.73
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.35
EFFECTIVE STREAM AREA(ACRES) = 424.20
TOTAL STREAM AREA(ACRES) = 424.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1075.00

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*****
FLOW PROCESS FROM NODE 390.00 TO NODE 391.00 IS CODE = 21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 317.00
ELEVATION DATA: UPSTREAM(FEET) = 860.00 DOWNSTREAM(FEET) = 775.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.195
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.364
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS  Tc
  LAND USE             GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" C        0.20    0.25    1.000   95   9.20
NATURAL FAIR COVER
"OPEN BRUSH"          C        1.20    0.25    1.000   92   9.20
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 5.18
TOTAL AREA(ACRES) = 1.40 PEAK FLOW RATE(CFS) = 5.18

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*****
FLOW PROCESS FROM NODE 391.00 TO NODE 392.00 IS CODE = 51
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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====

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ELEVATION DATA: UPSTREAM(FEET) = 775.00 DOWNSTREAM(FEET) = 700.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 545.00 CHANNEL SLOPE = 0.1376
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.024
SUBAREA LOSS RATE DATA(AMC III):

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DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
  LAND USE             GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" C        1.70    0.25    1.000   95
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" D        0.60    0.20    1.000   97
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.11
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.49
AVERAGE FLOW DEPTH(FEET) = 0.68 TRAVEL TIME(MIN.) = 1.40
Tc(MIN.) = 10.59
SUBAREA AREA(ACRES) = 2.30 SUBAREA RUNOFF(CFS) = 7.84
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 12.59

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.77 FLOW VELOCITY(FEET/SEC.) = 7.02
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 392.00 = 862.00 FEET.

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*****
FLOW PROCESS FROM NODE 392.00 TO NODE 393.00 IS CODE = 51
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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====

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```

ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 635.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1093.00 CHANNEL SLOPE = 0.0595
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.556
SUBAREA LOSS RATE DATA(AMC III):

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DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
  LAND USE             GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" C        1.40    0.25    1.000   91
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" C        8.40    0.25    1.000   95
NATURAL FAIR COVER
"OPEN BRUSH"          C        2.70    0.25    1.000   92
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" D        0.40    0.20    1.000   95
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" D        9.20    0.20    1.000   97
NATURAL FAIR COVER
"OPEN BRUSH"          D        0.60    0.20    1.000   96

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 46.69
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.15
AVERAGE FLOW DEPTH(FEET) = 1.48 TRAVEL TIME(MIN.) = 2.55

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Tc(MIN.) = 13.14  
SUBAREA AREA(ACRES) = 22.70 SUBAREA RUNOFF(CFS) = 68.01  
EFFECTIVE AREA(ACRES) = 26.40 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 26.4 PEAK FLOW RATE(CFS) = 79.05

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 1.80 FLOW VELOCITY(FEET/SEC.) = 8.15  
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 393.00 = 1955.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 393.00 TO NODE 394.00 IS CODE = 51  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 635.00 DOWNSTREAM(FEET) = 598.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 904.00 CHANNEL SLOPE = 0.0409  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.280

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	1.60	0.25	1.000	91
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	C	5.50	0.25	1.000	95
NATURAL FAIR COVER					
"OPEN BRUSH"	C	1.80	0.25	1.000	92
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	0.60	0.25	1.000	92
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	1.00	0.20	1.000	95
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	D	6.80	0.20	1.000	97

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 102.82

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.54

AVERAGE FLOW DEPTH(FEET) = 2.13 TRAVEL TIME(MIN.) = 2.00

Tc(MIN.) = 15.14

SUBAREA AREA(ACRES) = 17.30 SUBAREA RUNOFF(CFS) = 47.52

EFFECTIVE AREA(ACRES) = 43.70 AREA-AVERAGED Fm(INCH/HR) = 0.23

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 43.7 PEAK FLOW RATE(CFS) = 119.99

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 2.26 FLOW VELOCITY(FEET/SEC.) = 7.86  
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 394.00 = 2859.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 394.00 TO NODE 394.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====

MAINLINE Tc(MIN.) = 15.14

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.280

SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/  
LAND USE

SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	
NATURAL FAIR COVER					
"OPEN BRUSH"	D	2.50	0.20	1.000	96
NATURAL FAIR COVER					
"WOODLAND,GRASS"	D	0.10	0.20	1.000	95

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 7.21  
EFFECTIVE AREA(ACRES) = 46.30 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 46.3 PEAK FLOW RATE(CFS) = 127.19

\*\*\*\*\*  
FLOW PROCESS FROM NODE 394.00 TO NODE 395.00 IS CODE = 51  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 598.00 DOWNSTREAM(FEET) = 573.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 701.00 CHANNEL SLOPE = 0.0357  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.115

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	6.30	0.25	1.000	91
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	0.20	0.20	1.000	95
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	C	5.90	0.25	1.000	95
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	D	12.70	0.20	1.000	97
NATURAL FAIR COVER					
"OPEN BRUSH"	C	6.80	0.25	1.000	92
NATURAL FAIR COVER					
"OPEN BRUSH"	D	3.20	0.20	1.000	96

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 172.81

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.19

AVERAGE FLOW DEPTH(FEET) = 2.65 TRAVEL TIME(MIN.) = 1.43

Tc(MIN.) = 16.57

SUBAREA AREA(ACRES) = 35.10 SUBAREA RUNOFF(CFS) = 91.22

EFFECTIVE AREA(ACRES) = 81.40 AREA-AVERAGED Fm(INCH/HR) = 0.23

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 81.4 PEAK FLOW RATE(CFS) = 211.54

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 2.86 FLOW VELOCITY(FEET/SEC.) = 8.60  
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 395.00 = 3560.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 395.00 TO NODE 395.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 16.57  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.115  
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL ".4 DWELLING/ACRE"	C	1.00	0.25	0.900	86
RESIDENTIAL ".4 DWELLING/ACRE"	D	2.70	0.20	0.900	91
NATURAL FAIR COVER "WOODLAND,GRASS"	C	0.50	0.25	1.000	92
NATURAL FAIR COVER "WOODLAND,GRASS"	D	0.10	0.20	1.000	95

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.914  
 SUBAREA AREA(ACRES) = 4.30 SUBAREA RUNOFF(CFS) = 11.28  
 EFFECTIVE AREA(ACRES) = 85.70 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 85.7 PEAK FLOW RATE(CFS) = 222.82

\*\*\*\*\*

FLOW PROCESS FROM NODE 395.00 TO NODE 370.00 IS CODE = 31

-----

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 573.00 DOWNSTREAM(FEET) = 437.00  
 FLOW LENGTH(FEET) = 6286.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.5 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.89  
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 222.82  
 PIPE TRAVEL TIME(MIN.) = 5.55 Tc(MIN.) = 22.11  
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 370.00 = 9846.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 370.00 TO NODE 371.00 IS CODE = 51

-----

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

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 437.00 DOWNSTREAM(FEET) = 345.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1963.00 CHANNEL SLOPE = 0.0469  
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.434  
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	A	0.50	0.40	1.000	60
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	C	0.60	0.25	1.000	91
COMMERCIAL	A	1.50	0.40	0.100	52
COMMERCIAL	B	0.70	0.30	0.100	76
COMMERCIAL	C	1.60	0.25	0.100	86

COMMERCIAL D 1.10 0.20 0.100 91  
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.31  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.265  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 229.17  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.72  
 AVERAGE FLOW DEPTH(FEET) = 2.80 TRAVEL TIME(MIN.) = 3.36  
 Tc(MIN.) = 25.48  
 SUBAREA AREA(ACRES) = 6.00 SUBAREA RUNOFF(CFS) = 12.70  
 EFFECTIVE AREA(ACRES) = 91.70 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.95  
 TOTAL AREA(ACRES) = 91.7 PEAK FLOW RATE(CFS) = 222.82  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 2.77 FLOW VELOCITY(FEET/SEC.) = 9.65  
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 371.00 = 11809.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 25.48  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.434  
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "GRASS"	A	1.40	0.40	1.000	70
NATURAL FAIR COVER "GRASS"	C	2.80	0.25	1.000	93
NATURAL FAIR COVER "GRASS"	D	0.10	0.20	1.000	96
NATURAL FAIR COVER "OPEN BRUSH"	A	0.40	0.40	1.000	66
NATURAL FAIR COVER "OPEN BRUSH"	B	0.30	0.30	1.000	84
NATURAL FAIR COVER "OPEN BRUSH"	C	3.40	0.25	1.000	92

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 8.40 SUBAREA RUNOFF(CFS) = 16.26  
 EFFECTIVE AREA(ACRES) = 100.10 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.95  
 TOTAL AREA(ACRES) = 100.1 PEAK FLOW RATE(CFS) = 222.82  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 25.48  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.434  
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					

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"OPEN BRUSH"          D      0.80   0.20   1.000   96
PUBLIC PARK           A      0.10   0.40   0.850   52
PUBLIC PARK           C      3.80   0.25   0.850   86
PUBLIC PARK           D      2.50   0.20   0.850   91
RESIDENTIAL
".4 DWELLING/ACRE"    A      2.40   0.40   0.900   52
RESIDENTIAL
".4 DWELLING/ACRE"    B      0.70   0.30   0.900   76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.877
SUBAREA AREA(ACRES) = 10.30   SUBAREA RUNOFF(CFS) = 20.33
EFFECTIVE AREA(ACRES) = 110.40   AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.24   AREA-AVERAGED Ap = 0.95
TOTAL AREA(ACRES) = 110.4   PEAK FLOW RATE(CFS) = 222.82
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 25.48
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.434
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
".4 DWELLING/ACRE"    C      3.50   0.25   0.900   86
RESIDENTIAL
".4 DWELLING/ACRE"    D      1.10   0.20   0.900   91
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C      0.10   0.25   0.400   86
NATURAL FAIR COVER
"WOODLAND,GRASS"     B      0.20   0.30   1.000   83
NATURAL FAIR COVER
"WOODLAND,GRASS"     C      1.90   0.25   1.000   92
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.924
SUBAREA AREA(ACRES) = 6.80   SUBAREA RUNOFF(CFS) = 13.52
EFFECTIVE AREA(ACRES) = 117.20   AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.24   AREA-AVERAGED Ap = 0.94
TOTAL AREA(ACRES) = 117.2   PEAK FLOW RATE(CFS) = 233.12

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FLOW PROCESS FROM NODE 371.00 TO NODE 330.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 345.00   DOWNSTREAM(FEET) = 310.00
FLOW LENGTH(FEET) = 1065.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.36
ESTIMATED PIPE DIAMETER(INCH) = 48.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 233.12
PIPE TRAVEL TIME(MIN.) = 0.79   Tc(MIN.) = 26.27
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 330.00 = 12874.00 FEET.

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FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====

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TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 26.27
RAINFALL INTENSITY(INCH/HR) = 2.39
AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.24
AREA-AVERAGED Ap = 0.94
EFFECTIVE STREAM AREA(ACRES) = 117.20
TOTAL STREAM AREA(ACRES) = 117.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 233.12

```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	549.52	17.31	3.038	0.22( 0.08)	0.37	204.1	310.00
1	523.10	20.83	2.731	0.22( 0.08)	0.37	217.1	300.00
2	1075.00	20.87	2.729	0.22( 0.08)	0.35	424.2	320.00
3	233.12	26.27	2.391	0.24( 0.22)	0.94	117.2	390.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1744.34	17.31	3.038	0.23( 0.10)	0.43	633.1	310.00
2	1811.26	20.83	2.731	0.23( 0.10)	0.43	733.6	300.00
3	1811.60	20.87	2.729	0.23( 0.10)	0.43	734.4	320.00
4	1627.24	26.27	2.391	0.23( 0.10)	0.45	758.5	390.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 1811.60   Tc(MIN.) = 20.87
EFFECTIVE AREA(ACRES) = 734.39   AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.23   AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 758.5
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 330.00 = 12874.00 FEET.

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FLOW PROCESS FROM NODE 330.00 TO NODE 331.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

```

```

ELEVATION DATA: UPSTREAM(FEET) = 310.00   DOWNSTREAM(FEET) = 280.00
FLOW LENGTH(FEET) = 374.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 87.0 INCH PIPE IS 68.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 52.00
ESTIMATED PIPE DIAMETER(INCH) = 87.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1811.60
PIPE TRAVEL TIME(MIN.) = 0.12   Tc(MIN.) = 20.99
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 331.00 = 13248.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.99
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.720
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
APARTMENTS          A        17.50    0.40    0.200    52
APARTMENTS          B         1.50    0.30    0.200    76
APARTMENTS          C         0.70    0.25    0.200    86
NATURAL POOR COVER
"BARREN"            D         0.10    0.20    1.000    98
COMMERCIAL          A        44.60    0.40    0.100    52
COMMERCIAL          B         0.70    0.30    0.100    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.39
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.132
SUBAREA AREA(ACRES) = 65.10   SUBAREA RUNOFF(CFS) = 156.34
EFFECTIVE AREA(ACRES) = 799.49   AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.23   AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 823.6     PEAK FLOW RATE(CFS) = 1889.01

*****
FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.99
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.720
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         2.00    0.25    0.100    86
COMMERCIAL          D         4.10    0.20    0.100    91
NATURAL FAIR COVER
"WOODLAND,GRASS"   D         0.10    0.20    1.000    95
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.115
SUBAREA AREA(ACRES) = 6.20   SUBAREA RUNOFF(CFS) = 15.04
EFFECTIVE AREA(ACRES) = 805.69   AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.23   AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 829.8     PEAK FLOW RATE(CFS) = 1904.05

*****
FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 13
-----
>>>>CLEAR THE MAIN-STREAM MEMORY<<<<
=====
*****

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FLOW PROCESS FROM NODE 400.00 TO NODE 401.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 314.00
ELEVATION DATA: UPSTREAM(FEET) = 618.00   DOWNSTREAM(FEET) = 590.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.048
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.548
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS   Tc
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"8-10 DWELLINGS/ACRE"   C        1.20    0.25    0.400    86   6.05
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA RUNOFF(CFS) = 5.88
TOTAL AREA(ACRES) = 1.20   PEAK FLOW RATE(CFS) = 5.88

*****
FLOW PROCESS FROM NODE 401.00 TO NODE 402.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 590.00   DOWNSTREAM ELEVATION(FEET) = 588.00
STREET LENGTH(FEET) = 274.00   CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 22.27
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.53
HALFSTREET FLOOD WIDTH(FEET) = 20.66
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.78
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.48
STREET FLOW TRAVEL TIME(MIN.) = 1.64   Tc(MIN.) = 7.69
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.834
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE"   C        3.30    0.25    0.600    86
RESIDENTIAL
"8-10 DWELLINGS/ACRE"   C        4.40    0.25    0.400    86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.486
SUBAREA AREA(ACRES) = 7.70   SUBAREA RUNOFF(CFS) = 32.66

```

EFFECTIVE AREA(ACRES) = 8.90 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.47  
TOTAL AREA(ACRES) = 8.9 PEAK FLOW RATE(CFS) = 37.77

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.62 HALFSTREET FLOOD WIDTH(FEET) = 25.43  
FLOW VELOCITY(FEET/SEC.) = 3.16 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.95  
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.00 = 588.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 402.00 TO NODE 403.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 588.00 DOWNSTREAM(FEET) = 581.00  
FLOW LENGTH(FEET) = 805.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.5 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.77  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 37.77  
PIPE TRAVEL TIME(MIN.) = 1.53 Tc(MIN.) = 9.22  
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 1393.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 403.00 TO NODE 403.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.22  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.357  
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	C	0.10	0.25	1.000	92
RESIDENTIAL					
".4 DWELLING/ACRE"	C	2.00	0.25	0.900	86
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	8.80	0.25	0.600	86
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.10	0.30	0.400	76
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	4.90	0.25	0.400	86

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.577  
SUBAREA AREA(ACRES) = 15.90 SUBAREA RUNOFF(CFS) = 60.28  
EFFECTIVE AREA(ACRES) = 24.80 AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.54  
TOTAL AREA(ACRES) = 24.8 PEAK FLOW RATE(CFS) = 94.23

\*\*\*\*\*

FLOW PROCESS FROM NODE 403.00 TO NODE 403.00 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.) = 9.22  
RAINFALL INTENSITY(INCH/HR) = 4.36  
AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.25  
AREA-AVERAGED Ap = 0.54  
EFFECTIVE STREAM AREA(ACRES) = 24.80  
TOTAL STREAM AREA(ACRES) = 24.80  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 94.23

\*\*\*\*\*

FLOW PROCESS FROM NODE 430.00 TO NODE 431.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 329.00  
ELEVATION DATA: UPSTREAM(FEET) = 725.00 DOWNSTREAM(FEET) = 630.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.196  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.364  
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER						
"CHAPARRAL,NARROWLEAF"	C	0.10	0.25	1.000	95	9.20
NATURAL FAIR COVER						
"OPEN BRUSH"	C	1.30	0.25	1.000	92	9.20
NATURAL FAIR COVER						
"OPEN BRUSH"	D	0.10	0.20	1.000	96	9.20

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA RUNOFF(CFS) = 5.56  
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 5.56

\*\*\*\*\*

FLOW PROCESS FROM NODE 431.00 TO NODE 432.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 630.00 DOWNSTREAM(FEET) = 597.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 196.00 CHANNEL SLOPE = 0.1684  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.242  
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	D	0.10	0.20	1.000	97
NATURAL FAIR COVER					
"OPEN BRUSH"	C	1.70	0.25	1.000	92
NATURAL FAIR COVER					
"OPEN BRUSH"	D	0.10	0.20	1.000	96

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.98

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.01  
 AVERAGE FLOW DEPTH (FEET) = 0.65 TRAVEL TIME (MIN.) = 0.47  
 Tc (MIN.) = 9.66  
 SUBAREA AREA (ACRES) = 1.90 SUBAREA RUNOFF (CFS) = 6.84  
 EFFECTIVE AREA (ACRES) = 3.40 AREA-AVERAGED Fm (INCH/HR) = 0.25  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA (ACRES) = 3.4 PEAK FLOW RATE (CFS) = 12.23

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH (FEET) = 0.74 FLOW VELOCITY (FEET/SEC.) = 7.54  
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 432.00 = 525.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 432.00 TO NODE 433.00 IS CODE = 51  
 -----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 597.00 DOWNSTREAM (FEET) = 582.00  
 CHANNEL LENGTH THRU SUBAREA (FEET) = 520.00 CHANNEL SLOPE = 0.0288  
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 20.00  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.827

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	C	3.70	0.25	1.000	92
RESIDENTIAL ".4 DWELLING/ACRE"	C	1.20	0.25	0.900	86
RESIDENTIAL "3-4 DWELLINGS/ACRE"	C	1.20	0.25	0.600	86
NATURAL FAIR COVER "WOODLAND, GRASS"	C	0.30	0.25	1.000	92

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.906  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 22.61  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.55  
 AVERAGE FLOW DEPTH (FEET) = 1.29 TRAVEL TIME (MIN.) = 1.90  
 Tc (MIN.) = 11.56  
 SUBAREA AREA (ACRES) = 6.40 SUBAREA RUNOFF (CFS) = 20.74  
 EFFECTIVE AREA (ACRES) = 9.80 AREA-AVERAGED Fm (INCH/HR) = 0.23  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.94  
 TOTAL AREA (ACRES) = 9.8 PEAK FLOW RATE (CFS) = 31.70

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH (FEET) = 1.46 FLOW VELOCITY (FEET/SEC.) = 4.94  
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.00 = 1045.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 433.00 TO NODE 403.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 582.00 DOWNSTREAM (FEET) = 581.00  
 FLOW LENGTH (FEET) = 10.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.5 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 21.16  
 ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 31.70  
 PIPE TRAVEL TIME (MIN.) = 0.01 Tc (MIN.) = 11.57  
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 403.00 = 1055.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 403.00 TO NODE 403.00 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.) = 11.57  
 RAINFALL INTENSITY (INCH/HR) = 3.83  
 AREA-AVERAGED Fm (INCH/HR) = 0.23  
 AREA-AVERAGED Fp (INCH/HR) = 0.25  
 AREA-AVERAGED Ap = 0.94  
 EFFECTIVE STREAM AREA (ACRES) = 9.80  
 TOTAL STREAM AREA (ACRES) = 9.80  
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 31.70

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	94.23	9.22	4.357	0.25 (0.14)	0.54	24.8	400.00
2	31.70	11.57	3.825	0.25 (0.23)	0.94	9.8	430.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	123.22	9.22	4.357	0.25 (0.16)	0.64	32.6	400.00
2	114.06	11.57	3.825	0.25 (0.16)	0.65	34.6	430.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE (CFS) = 123.22 Tc (MIN.) = 9.22  
 EFFECTIVE AREA (ACRES) = 32.61 AREA-AVERAGED Fm (INCH/HR) = 0.16  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.64  
 TOTAL AREA (ACRES) = 34.6  
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 1393.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 403.00 TO NODE 404.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 581.00 DOWNSTREAM (FEET) = 570.00  
 FLOW LENGTH (FEET) = 1056.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.1 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 12.50  
 ESTIMATED PIPE DIAMETER (INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 123.22  
 PIPE TRAVEL TIME (MIN.) = 1.41 Tc (MIN.) = 10.63

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 404.00 = 2449.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.63

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.016

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.10	0.25	0.100	86
COMMERCIAL	D	0.10	0.20	0.100	91

NATURAL FAIR COVER "OPEN BRUSH"	C	0.10	0.25	1.000	92
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RESIDENTIAL ".4 DWELLING/ACRE"	C	4.90	0.25	0.900	86
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RESIDENTIAL ".4 DWELLING/ACRE"	D	1.50	0.20	0.900	91
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RESIDENTIAL "3-4 DWELLINGS/ACRE"	C	1.00	0.25	0.600	86
-------------------------------------	---	------	------	-------	----

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.842

SUBAREA AREA(ACRES) = 7.70 SUBAREA RUNOFF(CFS) = 26.44

EFFECTIVE AREA(ACRES) = 40.31 AREA-AVERAGED Fm(INCH/HR) = 0.17

AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.68

TOTAL AREA(ACRES) = 42.3 PEAK FLOW RATE(CFS) = 139.65

\*\*\*\*\*

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.63

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.016

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	8.80	0.25	0.500	86

RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	4.20	0.20	0.500	91
-------------------------------------	---	------	------	-------	----

RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	1.10	0.25	0.400	86
--------------------------------------	---	------	------	-------	----

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.492

SUBAREA AREA(ACRES) = 14.10 SUBAREA RUNOFF(CFS) = 49.50

EFFECTIVE AREA(ACRES) = 54.41 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.63

TOTAL AREA(ACRES) = 56.4 PEAK FLOW RATE(CFS) = 189.15

\*\*\*\*\*

FLOW PROCESS FROM NODE 404.00 TO NODE 405.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 570.00 DOWNSTREAM(FEET) = 565.00

FLOW LENGTH(FEET) = 1526.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 69.0 INCH PIPE IS 52.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 8.97

ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 189.15

PIPE TRAVEL TIME(MIN.) = 2.83 Tc(MIN.) = 13.46

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 405.00 = 3975.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.46

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.507

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.10	0.25	0.100	86
PUBLIC PARK	C	1.80	0.25	0.850	86
PUBLIC PARK	D	0.40	0.20	0.850	91

RESIDENTIAL ".4 DWELLING/ACRE"	C	1.80	0.25	0.900	86
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RESIDENTIAL ".4 DWELLING/ACRE"	D	2.80	0.20	0.900	91
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RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	6.10	0.25	0.500	86
-------------------------------------	---	------	------	-------	----

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.698

SUBAREA AREA(ACRES) = 13.00 SUBAREA RUNOFF(CFS) = 39.12

EFFECTIVE AREA(ACRES) = 67.41 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.64

TOTAL AREA(ACRES) = 69.4 PEAK FLOW RATE(CFS) = 203.36

\*\*\*\*\*

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.46

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.507

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	11.20	0.20	0.500	91

RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	7.80	0.25	0.400	86
--------------------------------------	---	------	------	-------	----

RESIDENTIAL "8-10 DWELLINGS/ACRE"	D	1.40	0.20	0.400	91
--------------------------------------	---	------	------	-------	----

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455

SUBAREA AREA(ACRES) = 20.40 SUBAREA RUNOFF(CFS) = 62.59

EFFECTIVE AREA(ACRES) = 87.81 AREA-AVERAGED Fm(INCH/HR) = 0.14

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.60

TOTAL AREA(ACRES) = 89.8 PEAK FLOW RATE(CFS) = 265.94

```

*****
FLOW PROCESS FROM NODE 405.00 TO NODE 406.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 565.00 DOWNSTREAM(FEET) = 495.00
FLOW LENGTH(FEET) = 2168.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.03
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 265.94
PIPE TRAVEL TIME(MIN.) = 1.57 Tc(MIN.) = 15.03
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 406.00 = 6143.00 FEET.

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*****
FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.03
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.293
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         5.50   0.25  0.100  86
COMMERCIAL          D         1.90   0.20  0.100  91
PUBLIC PARK         C         2.50   0.25  0.850  86
PUBLIC PARK         D         0.90   0.20  0.850  91
RESIDENTIAL
"11+ DWELLINGS/ACRE" C         36.40  0.25  0.200  86
RESIDENTIAL
"11+ DWELLINGS/ACRE" D         13.60  0.20  0.200  91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.224
SUBAREA AREA(ACRES) = 60.80 SUBAREA RUNOFF(CFS) = 177.28
EFFECTIVE AREA(ACRES) = 148.61 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 150.6 PEAK FLOW RATE(CFS) = 426.25

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*****
FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.03
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.293
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
".4 DWELLING/ACRE" C         4.70   0.25  0.900  86
RESIDENTIAL
".4 DWELLING/ACRE" D         2.10   0.20  0.900  91
RESIDENTIAL
"3-4 DWELLINGS/ACRE" C         0.10   0.25  0.600  86
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C         0.30   0.25  0.500  86

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RESIDENTIAL
"5-7 DWELLINGS/ACRE" D         0.10   0.20  0.500  91
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B         0.10   0.30  0.400  76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.868
SUBAREA AREA(ACRES) = 7.40 SUBAREA RUNOFF(CFS) = 20.57
EFFECTIVE AREA(ACRES) = 156.01 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 158.0 PEAK FLOW RATE(CFS) = 446.83

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*****
FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.03
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.293
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C         9.30   0.25  0.400  86
RESIDENTIAL
"8-10 DWELLINGS/ACRE" D         0.90   0.20  0.400  91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 10.20 SUBAREA RUNOFF(CFS) = 29.33
EFFECTIVE AREA(ACRES) = 166.21 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 168.2 PEAK FLOW RATE(CFS) = 476.15

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*****
FLOW PROCESS FROM NODE 406.00 TO NODE 407.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 495.00 DOWNSTREAM(FEET) = 395.00
FLOW LENGTH(FEET) = 2905.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.34
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 476.15
PIPE TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 16.80
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 407.00 = 9048.00 FEET.

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*****
FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.80
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.089
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS          D         0.30   0.20  0.200  91

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COMMERCIAL	B	0.60	0.30	0.100	76
COMMERCIAL	C	9.10	0.25	0.100	86
COMMERCIAL	D	6.70	0.20	0.100	91
PUBLIC PARK	C	0.50	0.25	0.850	86
PUBLIC PARK	D	2.60	0.20	0.850	91

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.22  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.219  
SUBAREA AREA (ACRES) = 19.80 SUBAREA RUNOFF (CFS) = 54.20  
EFFECTIVE AREA (ACRES) = 186.01 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.44  
TOTAL AREA (ACRES) = 188.0 PEAK FLOW RATE (CFS) = 499.90

\*\*\*\*\*  
FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 16.80  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.089  
SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	0.60	0.40	0.200	52
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.40	0.30	0.200	76
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	10.60	0.25	0.200	86
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.60	0.20	0.200	91
RESIDENTIAL					
".4 DWELLING/ACRE"	C	1.90	0.25	0.900	86
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.70	0.20	0.900	91

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.308  
SUBAREA AREA (ACRES) = 16.80 SUBAREA RUNOFF (CFS) = 45.54  
EFFECTIVE AREA (ACRES) = 202.81 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.42  
TOTAL AREA (ACRES) = 204.8 PEAK FLOW RATE (CFS) = 545.44

\*\*\*\*\*  
FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 16.80  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.089  
SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	14.30	0.25	0.600	86
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	15.30	0.20	0.600	91
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	0.40	0.40	0.500	52
RESIDENTIAL					

"5-7 DWELLINGS/ACRE"	B	1.50	0.30	0.500	76
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	5.10	0.25	0.500	86
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	D	0.90	0.20	0.500	91

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.579  
SUBAREA AREA (ACRES) = 37.50 SUBAREA RUNOFF (CFS) = 99.75  
EFFECTIVE AREA (ACRES) = 240.31 AREA-AVERAGED Fm (INCH/HR) = 0.11  
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.45  
TOTAL AREA (ACRES) = 242.3 PEAK FLOW RATE (CFS) = 645.19

\*\*\*\*\*  
FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 16.80  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.089  
SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.50	0.30	0.400	76
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	8.40	0.25	0.400	86
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	2.80	0.20	0.400	91
SCHOOL	B	0.60	0.30	0.600	76
SCHOOL	C	1.50	0.25	0.600	86
SCHOOL	D	3.50	0.20	0.600	91

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.455  
SUBAREA AREA (ACRES) = 20.30 SUBAREA RUNOFF (CFS) = 54.43  
EFFECTIVE AREA (ACRES) = 260.61 AREA-AVERAGED Fm (INCH/HR) = 0.11  
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.45  
TOTAL AREA (ACRES) = 262.6 PEAK FLOW RATE (CFS) = 699.62

\*\*\*\*\*  
FLOW PROCESS FROM NODE 407.00 TO NODE 430.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 395.00 DOWNSTREAM (FEET) = 372.00  
FLOW LENGTH (FEET) = 661.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 72.0 INCH PIPE IS 55.1 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 30.12  
ESTIMATED PIPE DIAMETER (INCH) = 72.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 699.62  
PIPE TRAVEL TIME (MIN.) = 0.37 Tc (MIN.) = 17.17  
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 430.00 = 9709.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 430.00 TO NODE 430.00 IS CODE = 10  
-----

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

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*****
FLOW PROCESS FROM NODE 430.00 TO NODE 430.00 IS CODE = 13
-----
>>>>CLEAR THE MAIN-STREAM MEMORY<<<<
=====
*****
FLOW PROCESS FROM NODE 410.00 TO NODE 411.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH (FEET) = 328.00
ELEVATION DATA: UPSTREAM (FEET) = 535.00 DOWNSTREAM (FEET) = 495.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 6.368
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 5.387
SUBAREA Tc AND LOSS RATE DATA (AMC III):
DEVELOPMENT TYPE/SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
".4 DWELLING/ACRE" D 0.50 0.20 0.900 91 7.53
RESIDENTIAL
"3-4 DWELLINGS/ACRE" D 0.20 0.20 0.600 91 6.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.814
SUBAREA RUNOFF (CFS) = 3.29
TOTAL AREA (ACRES) = 0.70 PEAK FLOW RATE (CFS) = 3.29

*****
FLOW PROCESS FROM NODE 411.00 TO NODE 412.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM (FEET) = 495.00 DOWNSTREAM (FEET) = 490.00
FLOW LENGTH (FEET) = 267.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 6.35
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 3.29
PIPE TRAVEL TIME (MIN.) = 0.70 Tc (MIN.) = 7.07
LONGEST FLOWPATH FROM NODE 410.00 TO NODE 412.00 = 595.00 FEET.

*****
FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc (MIN.) = 7.07
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 5.074
SUBAREA LOSS RATE DATA (AMC III):
DEVELOPMENT TYPE/SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL

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".4 DWELLING/ACRE" C 0.90 0.25 0.900 86
RESIDENTIAL
".4 DWELLING/ACRE" D 0.30 0.20 0.900 91
RESIDENTIAL
"3-4 DWELLINGS/ACRE" D 0.10 0.20 0.600 91
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 0.10 0.25 0.500 86
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 0.30 0.20 0.500 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.788
SUBAREA AREA (ACRES) = 1.70 SUBAREA RUNOFF (CFS) = 7.48
EFFECTIVE AREA (ACRES) = 2.40 AREA-AVERAGED Fm (INCH/HR) = 0.18
AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.80
TOTAL AREA (ACRES) = 2.4 PEAK FLOW RATE (CFS) = 10.58

*****
FLOW PROCESS FROM NODE 412.00 TO NODE 413.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM (FEET) = 490.00 DOWNSTREAM (FEET) = 480.00
FLOW LENGTH (FEET) = 520.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 8.62
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 10.58
PIPE TRAVEL TIME (MIN.) = 1.01 Tc (MIN.) = 8.08
LONGEST FLOWPATH FROM NODE 410.00 TO NODE 413.00 = 1115.00 FEET.

*****
FLOW PROCESS FROM NODE 413.00 TO NODE 413.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc (MIN.) = 8.08
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.701
SUBAREA LOSS RATE DATA (AMC III):
DEVELOPMENT TYPE/SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
".4 DWELLING/ACRE" C 2.00 0.25 0.900 86
RESIDENTIAL
".4 DWELLING/ACRE" D 0.40 0.20 0.900 91
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 0.40 0.25 0.500 86
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 0.30 0.20 0.500 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.810
SUBAREA AREA (ACRES) = 3.10 SUBAREA RUNOFF (CFS) = 12.57
EFFECTIVE AREA (ACRES) = 5.50 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.80
TOTAL AREA (ACRES) = 5.5 PEAK FLOW RATE (CFS) = 22.35

*****
FLOW PROCESS FROM NODE 413.00 TO NODE 414.00 IS CODE = 31

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-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 480.00 DOWNSTREAM(FEET) = 470.00
FLOW LENGTH(FEET) = 310.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.54
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 22.35
PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 8.49
LONGEST FLOWPATH FROM NODE 410.00 TO NODE 414.00 = 1425.00 FEET.

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*****
FLOW PROCESS FROM NODE 414.00 TO NODE 414.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 8.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.569
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.50 0.25 0.100 86
COMMERCIAL D 0.10 0.20 0.100 91
RESIDENTIAL
".4 DWELLING/ACRE" C 2.80 0.25 0.900 86
RESIDENTIAL
".4 DWELLING/ACRE" D 1.00 0.20 0.900 91
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 0.20 0.25 0.500 86
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 0.10 0.20 0.500 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.654
SUBAREA AREA(ACRES) = 5.70 SUBAREA RUNOFF(CFS) = 22.64
EFFECTIVE AREA(ACRES) = 11.20 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.73
TOTAL AREA(ACRES) = 11.2 PEAK FLOW RATE(CFS) = 44.34

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*****
FLOW PROCESS FROM NODE 414.00 TO NODE 414.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 8.49
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.569
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS C 0.10 0.25 0.200 86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.41
EFFECTIVE AREA(ACRES) = 11.30 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 11.3 PEAK FLOW RATE(CFS) = 44.74

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*****
FLOW PROCESS FROM NODE 414.00 TO NODE 415.00 IS CODE = 31
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```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 470.00 DOWNSTREAM(FEET) = 445.00
FLOW LENGTH(FEET) = 528.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.92
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 44.74
PIPE TRAVEL TIME(MIN.) = 0.52 Tc(MIN.) = 9.01
LONGEST FLOWPATH FROM NODE 410.00 TO NODE 415.00 = 1953.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 415.00 TO NODE 415.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

```

```

MAINLINE Tc(MIN.) = 9.01
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.416
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.90 0.25 0.100 86
COMMERCIAL D 0.60 0.20 0.100 91
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 6.30 0.25 0.500 86
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 3.70 0.20 0.500 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.448
SUBAREA AREA(ACRES) = 11.50 SUBAREA RUNOFF(CFS) = 44.63
EFFECTIVE AREA(ACRES) = 22.80 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 22.8 PEAK FLOW RATE(CFS) = 87.82

```

```

*****
FLOW PROCESS FROM NODE 415.00 TO NODE 416.00 IS CODE = 31
-----

```

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 445.00 DOWNSTREAM(FEET) = 415.00
FLOW LENGTH(FEET) = 650.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.23
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 87.82
PIPE TRAVEL TIME(MIN.) = 0.54 Tc(MIN.) = 9.54
LONGEST FLOWPATH FROM NODE 410.00 TO NODE 416.00 = 2603.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81
-----

```

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

```

MAINLINE Tc(MIN.) = 9.54  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.272  
 SUBAREA LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 APARTMENTS C 1.60 0.25 0.200 86  
 APARTMENTS D 10.90 0.20 0.200 91  
 COMMERCIAL C 1.30 0.25 0.100 86  
 COMMERCIAL D 1.30 0.20 0.100 91  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" C 1.10 0.25 0.200 86  
 RESIDENTIAL  
 "11+ DWELLINGS/ACRE" D 7.00 0.20 0.200 91  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.189  
 SUBAREA AREA(ACRES) = 23.20 SUBAREA RUNOFF(CFS) = 88.39  
 EFFECTIVE AREA(ACRES) = 46.00 AREA-AVERAGED Fm(INCH/HR) = 0.09  
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.38  
 TOTAL AREA(ACRES) = 46.0 PEAK FLOW RATE(CFS) = 173.26

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 9.54  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.272  
 SUBAREA LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 "3-4 DWELLINGS/ACRE" D 0.40 0.20 0.600 91  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 4.90 0.25 0.500 86  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" D 9.30 0.20 0.500 91  
 RESIDENTIAL  
 "8-10 DWELLINGS/ACRE" C 0.30 0.25 0.400 86  
 RESIDENTIAL  
 "8-10 DWELLINGS/ACRE" D 0.10 0.20 0.400 91  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
 SUBAREA AREA(ACRES) = 15.00 SUBAREA RUNOFF(CFS) = 56.21  
 EFFECTIVE AREA(ACRES) = 61.00 AREA-AVERAGED Fm(INCH/HR) = 0.09  
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.41  
 TOTAL AREA(ACRES) = 61.0 PEAK FLOW RATE(CFS) = 229.47

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 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.) = 9.54  
 RAINFALL INTENSITY(INCH/HR) = 4.27  
 AREA-AVERAGED Fm(INCH/HR) = 0.09  
 AREA-AVERAGED Fp(INCH/HR) = 0.22

AREA-AVERAGED Ap = 0.41  
 EFFECTIVE STREAM AREA(ACRES) = 61.00  
 TOTAL STREAM AREA(ACRES) = 61.00  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 229.47

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 420.00 TO NODE 421.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

\*\*\*\*\*  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 328.00  
 ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 495.00

$Tc = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.368  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.387  
 SUBAREA Tc AND LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" D 0.70 0.20 0.900 91 7.53  
 RESIDENTIAL  
 "3-4 DWELLINGS/ACRE" D 0.20 0.20 0.600 91 6.37  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.833  
 SUBAREA RUNOFF(CFS) = 4.23  
 TOTAL AREA(ACRES) = 0.90 PEAK FLOW RATE(CFS) = 4.23

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 421.00 TO NODE 422.00 IS CODE = 31  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 495.00 DOWNSTREAM(FEET) = 487.00  
 FLOW LENGTH(FEET) = 308.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.66  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 4.23  
 PIPE TRAVEL TIME(MIN.) = 0.67 Tc(MIN.) = 7.04  
 LONGEST FLOWPATH FROM NODE 420.00 TO NODE 422.00 = 636.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 422.00 TO NODE 422.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 7.04  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.087  
 SUBAREA LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" D 1.30 0.20 0.900 91  
 RESIDENTIAL

"3-4 DWELLINGS/ACRE" D 0.50 0.20 0.600 91  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.817  
 SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 7.98  
 EFFECTIVE AREA (ACRES) = 2.70 AREA-AVERAGED Fm (INCH/HR) = 0.16  
 AREA-AVERAGED Fp (INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.82  
 TOTAL AREA (ACRES) = 2.7 PEAK FLOW RATE (CFS) = 11.96

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 422.00 TO NODE 423.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 487.00 DOWNSTREAM (FEET) = 478.00  
 FLOW LENGTH (FEET) = 373.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.9 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 9.67  
 ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 11.96  
 PIPE TRAVEL TIME (MIN.) = 0.64 Tc (MIN.) = 7.68  
 LONGEST FLOWPATH FROM NODE 420.00 TO NODE 423.00 = 1009.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 423.00 TO NODE 423.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 7.68  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.838  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.80	0.30	0.900	76
RESIDENTIAL					
" .4 DWELLING/ACRE"	C	1.20	0.25	0.900	86
RESIDENTIAL					
" .4 DWELLING/ACRE"	D	0.20	0.20	0.900	91
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.40	0.30	0.600	76
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	1.70	0.25	0.600	86
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	0.10	0.20	0.600	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.26  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.750  
 SUBAREA AREA (ACRES) = 4.40 SUBAREA RUNOFF (CFS) = 18.38  
 EFFECTIVE AREA (ACRES) = 7.10 AREA-AVERAGED Fm (INCH/HR) = 0.18  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.78  
 TOTAL AREA (ACRES) = 7.1 PEAK FLOW RATE (CFS) = 29.74

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 423.00 TO NODE 424.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM (FEET) = 478.00 DOWNSTREAM (FEET) = 454.00  
 FLOW LENGTH (FEET) = 995.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.7 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 11.99  
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 29.74  
 PIPE TRAVEL TIME (MIN.) = 1.38 Tc (MIN.) = 9.06  
 LONGEST FLOWPATH FROM NODE 420.00 TO NODE 424.00 = 2004.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 424.00 TO NODE 424.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 9.06  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.400  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	C	0.80	0.25	0.200	86
APARTMENTS	D	0.40	0.20	0.200	91
PUBLIC PARK	B	0.90	0.30	0.850	76
PUBLIC PARK	C	0.40	0.25	0.850	86
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.10	0.30	0.900	76
RESIDENTIAL					
" .4 DWELLING/ACRE"	C	0.70	0.25	0.900	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.27  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.626  
 SUBAREA AREA (ACRES) = 3.30 SUBAREA RUNOFF (CFS) = 12.57  
 EFFECTIVE AREA (ACRES) = 10.40 AREA-AVERAGED Fm (INCH/HR) = 0.18  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.73  
 TOTAL AREA (ACRES) = 10.4 PEAK FLOW RATE (CFS) = 39.51

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 424.00 TO NODE 424.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 9.06  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.400  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.30	0.30	0.600	76
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	2.10	0.25	0.600	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.28  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600  
 SUBAREA AREA (ACRES) = 5.40 SUBAREA RUNOFF (CFS) = 20.57  
 EFFECTIVE AREA (ACRES) = 15.80 AREA-AVERAGED Fm (INCH/HR) = 0.18  
 AREA-AVERAGED Fp (INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.69  
 TOTAL AREA (ACRES) = 15.8 PEAK FLOW RATE (CFS) = 60.08

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 424.00 TO NODE 416.00 IS CODE = 31  
 -----

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 454.00 DOWNSTREAM(FEET) = 415.00
FLOW LENGTH(FEET) = 1555.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.31
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 60.08
PIPE TRAVEL TIME(MIN.) = 1.81 Tc(MIN.) = 10.87
LONGEST FLOWPATH FROM NODE 420.00 TO NODE 416.00 = 3559.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81
-----

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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 10.87
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.964
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp      Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
APARTMENTS          C      3.70     0.25     0.200     86
APARTMENTS          D      6.80     0.20     0.200     91
RESIDENTIAL
"11+ DWELLINGS/ACRE" C      0.70     0.25     0.200     86
RESIDENTIAL
"11+ DWELLINGS/ACRE" D      2.60     0.20     0.200     91
RESIDENTIAL
"3-4 DWELLINGS/ACRE" C      2.20     0.25     0.600     86
RESIDENTIAL
"3-4 DWELLINGS/ACRE" D      9.90     0.20     0.600     91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.387
SUBAREA AREA(ACRES) = 25.90 SUBAREA RUNOFF(CFS) = 90.50
EFFECTIVE AREA(ACRES) = 41.70 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 41.7 PEAK FLOW RATE(CFS) = 144.38

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```

*****
FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81
-----

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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 10.87
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.964
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp      Ap      SCS
LAND USE            GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D      1.30     0.20     0.500     91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 1.30 SUBAREA RUNOFF(CFS) = 4.52
EFFECTIVE AREA(ACRES) = 43.00 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 43.0 PEAK FLOW RATE(CFS) = 148.90

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```

*****
FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 1
-----

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```

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

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```

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.87
RAINFALL INTENSITY(INCH/HR) = 3.96
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.23
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 43.00
TOTAL STREAM AREA(ACRES) = 43.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 148.90

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```

** CONFLUENCE DATA **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	229.47	9.54	4.272	0.22( 0.09)	0.41	61.0	410.00
2	148.90	10.87	3.964	0.23( 0.12)	0.50	43.0	420.00

```

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

```

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** PEAK FLOW RATE TABLE **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	370.59	9.54	4.272	0.23( 0.10)	0.45	98.7	410.00
2	361.44	10.87	3.964	0.23( 0.10)	0.45	104.0	420.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 370.59 Tc(MIN.) = 9.54
EFFECTIVE AREA(ACRES) = 98.73 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 104.0
LONGEST FLOWPATH FROM NODE 420.00 TO NODE 416.00 = 3559.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 416.00 TO NODE 417.00 IS CODE = 31
-----

```

```

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

```

```

ELEVATION DATA: UPSTREAM(FEET) = 415.00 DOWNSTREAM(FEET) = 395.00
FLOW LENGTH(FEET) = 1084.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 50.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.12
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 370.59
PIPE TRAVEL TIME(MIN.) = 0.90 Tc(MIN.) = 10.44
LONGEST FLOWPATH FROM NODE 420.00 TO NODE 417.00 = 4643.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81
-----

```

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

```

```

=====
MAINLINE Tc(MIN.) = 10.44
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.058
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              C        1.70     0.25     0.100    86
COMMERCIAL              D        2.90     0.20     0.100    91
PUBLIC PARK             D        3.60     0.20     0.850    91
RESIDENTIAL
"11+ DWELLINGS/ACRE"   C        4.50     0.25     0.200    86
RESIDENTIAL
"11+ DWELLINGS/ACRE"   D        4.50     0.20     0.200    91
RESIDENTIAL
".4 DWELLING/ACRE"     D        0.10     0.20     0.900    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313
SUBAREA AREA(ACRES) = 17.30      SUBAREA RUNOFF(CFS) = 62.16
EFFECTIVE AREA(ACRES) = 116.03   AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 121.3        PEAK FLOW RATE(CFS) = 413.68

```

```

*****
FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81
-----

```

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

=====
MAINLINE Tc(MIN.) = 10.44
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.058
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C        0.80     0.25     0.400    86
RESIDENTIAL
"8-10 DWELLINGS/ACRE" D        0.20     0.20     0.400    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 1.00      SUBAREA RUNOFF(CFS) = 3.57
EFFECTIVE AREA(ACRES) = 117.03  AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 122.3        PEAK FLOW RATE(CFS) = 417.24

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*****
FLOW PROCESS FROM NODE 417.00 TO NODE 430.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 395.00 DOWNSTREAM(FEET) = 372.00
FLOW LENGTH(FEET) = 1572.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 54.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.03
ESTIMATED PIPE DIAMETER(INCH) = 69.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 417.24
PIPE TRAVEL TIME(MIN.) = 1.38      Tc(MIN.) = 11.82
LONGEST FLOWPATH FROM NODE 420.00 TO NODE 430.00 = 6215.00 FEET.

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*****
FLOW PROCESS FROM NODE 430.00 TO NODE 430.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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=====
MAINLINE Tc(MIN.) = 11.82
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.780
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL              B        0.70     0.30     0.100    76
COMMERCIAL              C        0.20     0.25     0.100    86
COMMERCIAL              D        0.40     0.20     0.100    91
PUBLIC PARK             B        5.70     0.30     0.850    76
PUBLIC PARK             C        4.50     0.25     0.850    86
PUBLIC PARK             D        9.40     0.20     0.850    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.803
SUBAREA AREA(ACRES) = 20.90      SUBAREA RUNOFF(CFS) = 67.46
EFFECTIVE AREA(ACRES) = 137.93  AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 143.2        PEAK FLOW RATE(CFS) = 455.41

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*****
FLOW PROCESS FROM NODE 430.00 TO NODE 430.00 IS CODE = 81
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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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=====
MAINLINE Tc(MIN.) = 11.82
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.780
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS
LAND USE                GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
PUBLIC PARK             A        0.70     0.40     0.850    52
PUBLIC PARK             B        8.90     0.30     0.850    76
PUBLIC PARK             C        1.20     0.25     0.850    86
PUBLIC PARK             D        3.70     0.20     0.850    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 14.50      SUBAREA RUNOFF(CFS) = 46.27
EFFECTIVE AREA(ACRES) = 152.43  AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 157.7        PEAK FLOW RATE(CFS) = 501.69

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*****
FLOW PROCESS FROM NODE 430.00 TO NODE 430.00 IS CODE = 11
-----

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

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	501.69	11.82	3.780	0.24( 0.12)	0.52	152.4	410.00
2	487.11	13.15	3.555	0.24( 0.12)	0.52	157.7	420.00

LONGEST FLOWPATH FROM NODE 420.00 TO NODE 430.00 = 6215.00 FEET.

```

** MEMORY BANK # 2 CONFLUENCE DATA **

```

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
1 699.62 17.17 3.051 0.24( 0.11) 0.45 260.6 400.00  
2 648.10 19.72 2.818 0.24( 0.11) 0.45 262.6 430.00  
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 430.00 = 9709.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
1 1102.30 11.82 3.780 0.24( 0.11) 0.48 331.8 410.00  
2 1114.68 13.15 3.555 0.24( 0.11) 0.48 357.4 420.00  
3 1115.30 17.17 3.051 0.24( 0.11) 0.48 418.3 400.00  
4 1030.71 19.72 2.818 0.24( 0.11) 0.48 420.3 430.00  
TOTAL AREA (ACRES) = 420.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1115.30 Tc(MIN.) = 17.170  
EFFECTIVE AREA(ACRES) = 418.31 AREA-AVERAGED Fm(INCH/HR) = 0.11  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 420.3  
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 430.00 = 9709.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 430.00 TO NODE 431.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 372.00 DOWNSTREAM(FEET) = 300.00  
FLOW LENGTH(FEET) = 1358.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 78.0 INCH PIPE IS 62.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 39.33  
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 1115.30  
PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 17.75  
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 431.00 = 11067.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 431.00 TO NODE 431.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 17.75  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.994  
SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
APARTMENTS A 7.40 0.40 0.200 52  
APARTMENTS B 15.00 0.30 0.200 76  
APARTMENTS C 5.80 0.25 0.200 86  
APARTMENTS D 2.50 0.20 0.200 91  
COMMERCIAL A 9.10 0.40 0.100 52  
COMMERCIAL B 1.50 0.30 0.100 76  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.32  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.174  
SUBAREA AREA(ACRES) = 41.30 SUBAREA RUNOFF(CFS) = 109.23  
EFFECTIVE AREA(ACRES) = 459.61 AREA-AVERAGED Fm(INCH/HR) = 0.11  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.45

TOTAL AREA(ACRES) = 461.6 PEAK FLOW RATE(CFS) = 1194.15

\*\* PEAK FLOW RATE TABLE \*\*

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
1 1198.97 12.39 3.678 0.24( 0.11) 0.45 373.1 410.00  
2 1205.87 13.73 3.468 0.24( 0.11) 0.45 398.7 420.00  
3 1194.15 17.75 2.994 0.24( 0.11) 0.45 459.6 400.00  
4 1106.41 20.31 2.771 0.24( 0.11) 0.45 461.6 430.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 1205.87 Tc(MIN.) = 13.73  
AREA-AVERAGED Fm(INCH/HR) = 0.11 AREA-AVERAGED Fp(INCH/HR) = 0.24  
AREA-AVERAGED Ap = 0.45 EFFECTIVE AREA(ACRES) = 398.65

\*\*\*\*\*

FLOW PROCESS FROM NODE 431.00 TO NODE 431.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 13.73  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.468  
SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.50 0.25 0.100 86  
COMMERCIAL D 0.40 0.20 0.100 91  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA(ACRES) = 0.90 SUBAREA RUNOFF(CFS) = 2.79  
EFFECTIVE AREA(ACRES) = 399.55 AREA-AVERAGED Fm(INCH/HR) = 0.11  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.45  
TOTAL AREA(ACRES) = 462.5 PEAK FLOW RATE(CFS) = 1208.66

\*\*\*\*\*

FLOW PROCESS FROM NODE 431.00 TO NODE 331.00 IS CODE = 11

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

\*\* MAIN STREAM CONFLUENCE DATA \*\*

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
1 1201.93 12.39 3.678 0.24( 0.11) 0.45 374.0 410.00  
2 1208.66 13.73 3.468 0.24( 0.11) 0.45 399.6 420.00  
3 1196.55 17.75 2.994 0.24( 0.11) 0.45 460.5 400.00  
4 1108.64 20.31 2.771 0.24( 0.11) 0.45 462.5 430.00  
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 331.00 = 11067.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER  
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE  
1 1859.02 17.43 3.026 0.23( 0.09) 0.40 704.4 310.00  
2 1903.90 20.95 2.722 0.23( 0.09) 0.41 804.9 300.00  
3 1904.05 20.99 2.720 0.23( 0.09) 0.41 805.7 320.00  
4 1708.18 26.39 2.385 0.23( 0.10) 0.42 829.8 390.00  
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 331.00 = 13248.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2818.24	12.39	3.678	0.24( 0.10)	0.42	875.0	410.00
2	2894.56	13.73	3.468	0.24( 0.10)	0.42	954.5	420.00
3	3056.53	17.43	3.026	0.24( 0.10)	0.42	1160.0	310.00
4	3059.64	17.75	2.994	0.24( 0.10)	0.42	1174.0	400.00
5	3004.40	20.31	2.771	0.24( 0.10)	0.42	1249.2	430.00
6	2992.24	20.95	2.722	0.24( 0.10)	0.42	1267.4	300.00
7	2991.37	20.99	2.720	0.24( 0.10)	0.42	1268.2	320.00
8	2656.13	26.39	2.385	0.24( 0.10)	0.43	1292.3	390.00
TOTAL AREA(ACRES) =		1292.3					

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3059.64 Tc(MIN.) = 17.746  
EFFECTIVE AREA(ACRES) = 1174.01 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.42  
TOTAL AREA(ACRES) = 1292.3  
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 331.00 = 13248.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1292.3 TC(MIN.) = 17.75  
EFFECTIVE AREA(ACRES) = 1174.01 AREA-AVERAGED Fm(INCH/HR)= 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.419  
PEAK FLOW RATE(CFS) = 3059.64

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2818.24	12.39	3.678	0.24( 0.10)	0.42	875.0	410.00
2	2894.56	13.73	3.468	0.24( 0.10)	0.42	954.5	420.00
3	3056.53	17.43	3.026	0.24( 0.10)	0.42	1160.0	310.00
4	3059.64	17.75	2.994	0.24( 0.10)	0.42	1174.0	400.00
5	3004.40	20.31	2.771	0.24( 0.10)	0.42	1249.2	430.00
6	2992.24	20.95	2.722	0.24( 0.10)	0.42	1267.4	300.00
7	2991.37	20.99	2.720	0.24( 0.10)	0.42	1268.2	320.00
8	2656.13	26.39	2.385	0.24( 0.10)	0.43	1292.3	390.00

=====

END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*  
 RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
 (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
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 Ver. 20.0 Release Date: 06/01/2013 License ID 1237

Analysis prepared by:

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
 \* RMV PA-3 BODR 2022 - SUBWATERSHED C \*  
 \* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
 \* 25-YR HC SEPT 2022 ROKAMOTO \*  
 \*\*\*\*\*

FILE NAME: PA3C25HC.DAT  
 TIME/DATE OF STUDY: 19:27 09/17/2022

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00  
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
 \*DATA BANK RAINFALL USED\*  
 \*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET- CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	STREET-CROSSFALL: HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	MANNING LIP HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167 0.0150
2	32.0	27.0	0.200/0.200/ ---	0.67	2.00	0.0312	0.167 0.0150
3	13.0	8.0	0.200/0.200/ ---	0.33	1.00	0.3120	0.125 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET  
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
 \*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00  
 ELEVATION DATA: UPSTREAM(FEET) = 644.00 DOWNSTREAM(FEET) = 641.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.438  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.587  
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	1.60	0.20	0.200	75	8.44

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
 SUBAREA RUNOFF(CFS) = 5.11  
 TOTAL AREA(ACRES) = 1.60 PEAK FLOW RATE(CFS) = 5.11

C1-1

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 62  
 -----

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

=====

UPSTREAM ELEVATION(FEET) = 641.00 DOWNSTREAM ELEVATION(FEET) = 637.00  
 STREET LENGTH(FEET) = 470.00 CURB HEIGHT(INCHES) = 8.0  
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
 INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

C1-2

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.99  
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
 STREET FLOW DEPTH(FEET) = 0.43  
 HALFSTREET FLOOD WIDTH(FEET) = 15.04  
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.48  
 PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.07  
 STREET FLOW TRAVEL TIME(MIN.) = 3.16 Tc(MIN.) = 11.59  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.997

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	0.10	0.20	0.100	75
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	4.30	0.20	0.200	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.198  
 SUBAREA AREA(ACRES) = 4.40 SUBAREA RUNOFF(CFS) = 11.71  
 EFFECTIVE AREA(ACRES) = 6.00 AREA-AVERAGED Fm(INCH/HR) = 0.04  
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20  
 TOTAL AREA(ACRES) = 6.0 PEAK FLOW RATE(CFS) = 15.97

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.54  
 FLOW VELOCITY(FEET/SEC.) = 2.71 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.29  
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 800.00 FEET.

```
*****
FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 637.00 DOWNSTREAM(FEET) = 634.00
FLOW LENGTH(FEET) = 563.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.91
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.97
PIPE TRAVEL TIME(MIN.) = 1.59 Tc(MIN.) = 13.18
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1363.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
```

```
MAINLINE Tc(MIN.) = 13.18
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.787 C1-3
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 5.60 0.25 0.200 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.40 0.20 0.200 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 19.73
EFFECTIVE AREA(ACRES) = 14.00 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 14.0 PEAK FLOW RATE(CFS) = 34.56
```

```
*****
FLOW PROCESS FROM NODE 303.00 TO NODE 304.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 634.00 DOWNSTREAM(FEET) = 630.00
FLOW LENGTH(FEET) = 1072.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.18
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.56
PIPE TRAVEL TIME(MIN.) = 2.89 Tc(MIN.) = 16.07
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 304.00 = 2435.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 304.00 TO NODE 304.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.07
```

```
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.491 C1-4
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 2.90 0.25 0.100 69
COMMERCIAL D 4.50 0.20 0.100 75
PUBLIC PARK D 0.10 0.20 0.850 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 5.70 0.25 0.200 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.40 0.20 0.200 75
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C 0.50 0.25 0.400 69
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.164
SUBAREA AREA(ACRES) = 16.10 SUBAREA RUNOFF(CFS) = 35.54
EFFECTIVE AREA(ACRES) = 30.10 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 30.1 PEAK FLOW RATE(CFS) = 66.38
```

```
*****
FLOW PROCESS FROM NODE 304.00 TO NODE 304.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
```

```
MAINLINE Tc(MIN.) = 16.07
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.491 C1-4
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
SCHOOL C 5.70 0.25 0.600 69
SCHOOL D 6.70 0.20 0.600 75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 12.40 SUBAREA RUNOFF(CFS) = 26.31
EFFECTIVE AREA(ACRES) = 42.50 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 42.5 PEAK FLOW RATE(CFS) = 92.68
```

```
*****
FLOW PROCESS FROM NODE 304.00 TO NODE 305.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 630.00 DOWNSTREAM(FEET) = 610.00
FLOW LENGTH(FEET) = 1290.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.38
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 92.68
PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 17.68
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 305.00 = 3725.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
```

```

=====
MAINLINE Tc(MIN.) = 17.68
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.360
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         1.00   0.25   0.100  69
COMMERCIAL          D         0.90   0.20   0.100  75
RESIDENTIAL
"11+ DWELLINGS/ACRE" C         0.60   0.25   0.200  69
RESIDENTIAL
"11+ DWELLINGS/ACRE" D         0.10   0.20   0.200  75
SCHOOL              C         0.10   0.25   0.600  69
SCHOOL              D         0.50   0.20   0.600  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.216
SUBAREA AREA(ACRES) = 3.20   SUBAREA RUNOFF(CFS) = 6.66
EFFECTIVE AREA(ACRES) = 45.70   AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 45.7   PEAK FLOW RATE(CFS) = 94.34

```

C1-5

```

*****
FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 82
-----
>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 3668.00
ELEVATION DATA: UPSTREAM(FEET) = 663.00   DOWNSTREAM(FEET) = 610.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 18.909
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.272
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS   Tc
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL          C         1.70   0.25   0.100  69  18.91
COMMERCIAL          D         4.40   0.20   0.100  75  18.91
RESIDENTIAL
"11+ DWELLINGS/ACRE" C         0.60   0.25   0.200  69  20.15
RESIDENTIAL
"11+ DWELLINGS/ACRE" D         1.30   0.20   0.200  75  20.15
RESIDENTIAL
"3-4 DWELLINGS/ACRE" D         7.10   0.20   0.600  75  25.63
RESIDENTIAL
"3-4 DWELLINGS/ACRE" C         2.80   0.25   0.600  69  25.63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.387
SUBAREA AREA(ACRES) = 17.90   INITIAL SUBAREA RUNOFF(CFS) = 35.27

```

C1-6

```

** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
MAINLINE Tc(MIN.) = 17.68
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.360
SUBAREA AREA(ACRES) = 17.90   SUBAREA RUNOFF(CFS) = 36.69
EFFECTIVE AREA(ACRES) = 63.60   AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.32
TOTAL AREA(ACRES) = 63.6   PEAK FLOW RATE(CFS) = 131.03

```

```

*****
FLOW PROCESS FROM NODE 305.00 TO NODE 317.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 610.00   DOWNSTREAM(FEET) = 535.00
FLOW LENGTH(FEET) = 1537.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.48
ESTIMATED PIPE DIAMETER(INCH) = 36.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 131.03
PIPE TRAVEL TIME(MIN.) = 1.14   Tc(MIN.) = 18.82
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 317.00 = 5262.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 317.00 TO NODE 317.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----

```

```

MAINLINE Tc(MIN.) = 18.82
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.278
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         3.30   0.25   0.100  69
COMMERCIAL          D         0.40   0.20   0.100  75
PUBLIC PARK         C         0.10   0.25   0.850  69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C         0.20   0.25   0.500  69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.139
SUBAREA AREA(ACRES) = 4.00   SUBAREA RUNOFF(CFS) = 8.08
EFFECTIVE AREA(ACRES) = 67.60   AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 67.6   PEAK FLOW RATE(CFS) = 134.41

```

C1-7

```

*****
FLOW PROCESS FROM NODE 317.00 TO NODE 317.00 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.) = 18.82
RAINFALL INTENSITY(INCH/HR) = 2.28
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA(ACRES) = 67.60
TOTAL STREAM AREA(ACRES) = 67.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 134.41

```

```

*****
FLOW PROCESS FROM NODE 310.00 TO NODE 311.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

```

=====
INITIAL SUBAREA FLOW-LENGTH (FEET) = 330.00
ELEVATION DATA: UPSTREAM (FEET) = 629.00 DOWNSTREAM (FEET) = 625.00

Tc = K \* [(LENGTH \*\* 3.00) / (ELEVATION CHANGE)] \*\* 0.20

SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 7.474

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.842

SUBAREA Tc AND LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL D 0.10 0.20 0.100 75 7.47

RESIDENTIAL
"11+ DWELLINGS/ACRE" C 1.10 0.25 0.200 69 7.97

RESIDENTIAL
"11+ DWELLINGS/ACRE" D 0.20 0.20 0.200 75 7.97

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.193

SUBAREA RUNOFF (CFS) = 4.78

TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 4.78

C1-10

\*\*\*\*\*
FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 IS CODE = 62

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

>>>> (STREET TABLE SECTION # 1 USED) <<<<<

UPSTREAM ELEVATION (FEET) = 625.00 DOWNSTREAM ELEVATION (FEET) = 623.00
STREET LENGTH (FEET) = 300.00 CURB HEIGHT (INCHES) = 8.0
STREET HALFWIDTH (FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00

INSIDE STREET CROSSFALL (DECIMAL) = 0.018

OUTSIDE STREET CROSSFALL (DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL (DECIMAL) = 0.020

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

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

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 9.05

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.42

HALFSTREET FLOOD WIDTH (FEET) = 14.57

AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.17

PRODUCT OF DEPTH&VELOCITY (FT\*FT/SEC.) = 0.92

STREET FLOW TRAVEL TIME (MIN.) = 2.31 Tc (MIN.) = 9.78

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.299

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.50 0.25 0.100 69

COMMERCIAL D 0.20 0.20 0.100 75

RESIDENTIAL

"11+ DWELLINGS/ACRE" C 0.70 0.25 0.200 69

RESIDENTIAL

"11+ DWELLINGS/ACRE" D 0.50 0.20 0.200 75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.141

C1-11

SUBAREA AREA (ACRES) = 2.90 SUBAREA RUNOFF (CFS) = 8.52
EFFECTIVE AREA (ACRES) = 4.30 AREA-AVERAGED Fm (INCH/HR) = 0.04
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.16
TOTAL AREA (ACRES) = 4.3 PEAK FLOW RATE (CFS) = 12.62

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.46 HALFSTREET FLOOD WIDTH (FEET) = 16.76

FLOW VELOCITY (FEET/SEC.) = 2.34 DEPTH\*VELOCITY (FT\*FT/SEC.) = 1.08

LONGEST FLOWPATH FROM NODE 310.00 TO NODE 312.00 = 630.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 312.00 TO NODE 313.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 623.00 DOWNSTREAM (FEET) = 620.00

FLOW LENGTH (FEET) = 369.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.0 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 6.40

ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 12.62

PIPE TRAVEL TIME (MIN.) = 0.96 Tc (MIN.) = 10.74

LONGEST FLOWPATH FROM NODE 310.00 TO NODE 313.00 = 999.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 313.00 TO NODE 313.00 IS CODE = 81

>>>> ADDITION OF SUBAREA TO MAINLINE PEAK FLOW <<<<<

MAINLINE Tc (MIN.) = 10.74

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.129

C1-12

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.90 0.25 0.100 69

COMMERCIAL D 2.50 0.20 0.100 75

RESIDENTIAL

"11+ DWELLINGS/ACRE" C 0.80 0.25 0.200 69

RESIDENTIAL

"11+ DWELLINGS/ACRE" D 0.70 0.20 0.200 75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.22

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.125

SUBAREA AREA (ACRES) = 5.90 SUBAREA RUNOFF (CFS) = 16.46

EFFECTIVE AREA (ACRES) = 10.20 AREA-AVERAGED Fm (INCH/HR) = 0.03

AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.14

TOTAL AREA (ACRES) = 10.2 PEAK FLOW RATE (CFS) = 28.43

\*\*\*\*\*
FLOW PROCESS FROM NODE 313.00 TO NODE 314.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 620.00 DOWNSTREAM (FEET) = 615.00

FLOW LENGTH (FEET) = 338.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.2 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 9.98

ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 28.43  
PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 11.31  
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 314.00 = 1337.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 314.00 TO NODE 314.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 11.31  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.039  
SUBAREA LOSS RATE DATA(AMC II):

C1-13

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.20	0.25	0.100	69
COMMERCIAL	D	0.10	0.20	0.100	75
PUBLIC PARK	C	0.20	0.25	0.850	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	6.10	0.25	0.200	69
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	6.10	0.20	0.200	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.208  
SUBAREA AREA(ACRES) = 12.70 SUBAREA RUNOFF(CFS) = 34.20  
EFFECTIVE AREA(ACRES) = 22.90 AREA-AVERAGED Fm(INCH/HR) = 0.04  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.18  
TOTAL AREA(ACRES) = 22.9 PEAK FLOW RATE(CFS) = 61.81

\*\*\*\*\*  
FLOW PROCESS FROM NODE 314.00 TO NODE 315.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 615.00 DOWNSTREAM(FEET) = 600.00  
FLOW LENGTH(FEET) = 578.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.56  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 61.81  
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 11.97  
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 315.00 = 1915.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 315.00 TO NODE 315.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 11.97  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.943  
SUBAREA LOSS RATE DATA(AMC II):

C1-14

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.70	0.25	0.100	69
COMMERCIAL	D	1.30	0.20	0.100	75
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	3.00	0.25	0.200	69

RESIDENTIAL  
"11+ DWELLINGS/ACRE" D 2.10 0.20 0.200 75  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" C 3.70 0.25 0.500 69  
RESIDENTIAL  
"5-7 DWELLINGS/ACRE" D 6.00 0.20 0.500 75  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.347  
SUBAREA AREA(ACRES) = 17.80 SUBAREA RUNOFF(CFS) = 45.92  
EFFECTIVE AREA(ACRES) = 40.70 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.25  
TOTAL AREA(ACRES) = 40.7 PEAK FLOW RATE(CFS) = 105.74

\*\*\*\*\*  
FLOW PROCESS FROM NODE 315.00 TO NODE 316.00 IS CODE = 31  
-----

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

-----  
ELEVATION DATA: UPSTREAM(FEET) = 600.00 DOWNSTREAM(FEET) = 569.00  
FLOW LENGTH(FEET) = 2176.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.0 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.45  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 105.74  
PIPE TRAVEL TIME(MIN.) = 2.70 Tc(MIN.) = 14.67  
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 316.00 = 4091.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 316.00 TO NODE 316.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 14.67  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.623  
SUBAREA LOSS RATE DATA(AMC II):

C1-15

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	C	0.40	0.25	0.200	69
RESIDENTIAL ".4 DWELLING/ACRE"	D	0.30	0.20	0.900	75
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	6.80	0.25	0.500	69
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	19.10	0.20	0.500	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500  
SUBAREA AREA(ACRES) = 26.60 SUBAREA RUNOFF(CFS) = 60.25  
EFFECTIVE AREA(ACRES) = 67.30 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 67.3 PEAK FLOW RATE(CFS) = 154.28

\*\*\*\*\*  
FLOW PROCESS FROM NODE 316.00 TO NODE 317.00 IS CODE = 31  
-----

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

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 569.00 DOWNSTREAM(FEET) = 535.00
FLOW LENGTH(FEET) = 759.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.70
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 154.28
PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 15.22
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 317.00 = 4850.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 317.00 TO NODE 317.00 IS CODE = 81
-----

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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

MAINLINE Tc(MIN.) = 15.22
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.569
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           C      0.40    0.25    0.100  69
COMMERCIAL           D      0.10    0.20    0.100  75
RESIDENTIAL
".4 DWELLING/ACRE"  C      0.70    0.25    0.900  69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C      8.90    0.25    0.500  69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D      7.40    0.20    0.500  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.505
SUBAREA AREA(ACRES) = 17.50 SUBAREA RUNOFF(CFS) = 38.63
EFFECTIVE AREA(ACRES) = 84.80 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 84.8 PEAK FLOW RATE(CFS) = 189.60

```

C1-16

```

*****
FLOW PROCESS FROM NODE 317.00 TO NODE 317.00 IS CODE = 1
-----

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```

>>>>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.) = 15.22
RAINFALL INTENSITY(INCH/HR) = 2.57
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.38
EFFECTIVE STREAM AREA(ACRES) = 84.80
TOTAL STREAM AREA(ACRES) = 84.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 189.60

```

```

** CONFLUENCE DATA **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES) NODE
1         134.41 18.82 2.278 0.22( 0.07) 0.31 67.6 300.00
2         189.60 15.22 2.569 0.22( 0.08) 0.38 84.8 310.00

```

```

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

```

```

** PEAK FLOW RATE TABLE **
STREAM    Q    Tc    Intensity    Fp(Fm)    Ap    Ae    HEADWATER
NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) (ACRES) NODE
1         312.63 15.22 2.569 0.22( 0.08) 0.35 139.5 310.00
2         301.85 18.82 2.278 0.22( 0.08) 0.35 152.4 300.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 312.63 Tc(MIN.) = 15.22
EFFECTIVE AREA(ACRES) = 139.49 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 152.4
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 317.00 = 5262.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 317.00 TO NODE 307.00 IS CODE = 31
-----

```

```

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

```

```

ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 374.00
FLOW LENGTH(FEET) = 3798.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.45
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 312.63
PIPE TRAVEL TIME(MIN.) = 2.39 Tc(MIN.) = 17.62
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 307.00 = 9060.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 307.00 TO NODE 307.00 IS CODE = 81
-----

```

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

MAINLINE Tc(MIN.) = 17.62
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.365
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS           C      0.10    0.25    0.200  69
COMMERCIAL           A      1.40    0.40    0.100  32
COMMERCIAL           B      4.80    0.30    0.100  56
COMMERCIAL           C      5.00    0.25    0.100  69
COMMERCIAL           D      3.70    0.20    0.100  75
PUBLIC PARK          D      5.00    0.20    0.850  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.288
SUBAREA AREA(ACRES) = 20.00 SUBAREA RUNOFF(CFS) = 41.44
EFFECTIVE AREA(ACRES) = 159.49 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 172.4 PEAK FLOW RATE(CFS) = 328.50

```

C1-17

```

*****
FLOW PROCESS FROM NODE 307.00 TO NODE 307.00 IS CODE = 81
-----

```

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

```

```

=====
MAINLINE Tc(MIN.) = 17.62
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.365
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"    C      4.00    0.25    0.200    69
RESIDENTIAL
"11+ DWELLINGS/ACRE"    D     12.70    0.20    0.200    75
RESIDENTIAL
".4 DWELLING/ACRE"      B      1.10    0.30    0.900    56
RESIDENTIAL
".4 DWELLING/ACRE"      C      1.50    0.25    0.900    69
RESIDENTIAL
".4 DWELLING/ACRE"      D      2.50    0.20    0.900    75
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    B      0.10    0.30    0.500    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.364
SUBAREA AREA(ACRES) = 21.90    SUBAREA RUNOFF(CFS) = 44.98
EFFECTIVE AREA(ACRES) = 181.39    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22    AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 194.3    PEAK FLOW RATE(CFS) = 373.48

```

C1-17

```

*****
FLOW PROCESS FROM NODE 307.00 TO NODE 307.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

```

```

MAINLINE Tc(MIN.) = 17.62
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.365
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C      4.50    0.25    0.500    69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    D      1.40    0.20    0.500    75
SCHOOL                  B      2.20    0.30    0.600    56
SCHOOL                  C      6.80    0.25    0.600    69
SCHOOL                  D      7.90    0.20    0.600    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.574
SUBAREA AREA(ACRES) = 22.80    SUBAREA RUNOFF(CFS) = 45.77
EFFECTIVE AREA(ACRES) = 204.19    AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22    AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 217.1    PEAK FLOW RATE(CFS) = 419.25

```

C1-17

```

*****
FLOW PROCESS FROM NODE 307.00 TO NODE 330.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

```

```

ELEVATION DATA: UPSTREAM(FEET) = 374.00    DOWNSTREAM(FEET) = 310.00
FLOW LENGTH(FEET) = 847.00    MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.8 INCHES

```

```

PIPE-FLOW VELOCITY(FEET/SEC.) = 35.33
ESTIMATED PIPE DIAMETER(INCH) = 51.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 419.25
PIPE TRAVEL TIME(MIN.) = 0.40    Tc(MIN.) = 18.02
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 330.00 = 9907.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====

```

```

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 18.02
RAINFALL INTENSITY(INCH/HR) = 2.34
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.37
EFFECTIVE STREAM AREA(ACRES) = 204.19
TOTAL STREAM AREA(ACRES) = 217.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 419.25

```

```

*****
FLOW PROCESS FROM NODE 320.00 TO NODE 321.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

```

```

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 636.00    DOWNSTREAM(FEET) = 633.00

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```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.438
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.587

```

C1-20

```

SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS    Tc
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"    C      2.80    0.25    0.200    69    8.44
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 8.91
TOTAL AREA(ACRES) = 2.80    PEAK FLOW RATE(CFS) = 8.91

```

```

*****
FLOW PROCESS FROM NODE 321.00 TO NODE 322.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====

```

```

UPSTREAM ELEVATION(FEET) = 633.00    DOWNSTREAM ELEVATION(FEET) = 628.00
STREET LENGTH(FEET) = 360.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

```

```

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

```

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 19.33  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.47  
HALFSTREET FLOOD WIDTH(FEET) = 17.15  
AVERAGE FLOW VELOCITY( FEET/SEC.) = 3.43  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.61  
STREET FLOW TRAVEL TIME(MIN.) = 1.75 Tc(MIN.) = 10.19  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.224

C1-21

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL D 0.10 0.20 0.100 75  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 6.30 0.25 0.200 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" D 0.20 0.20 0.200 75  
SCHOOL C 0.70 0.25 0.600 69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.237  
SUBAREA AREA(ACRES) = 7.30 SUBAREA RUNOFF(CFS) = 20.80  
EFFECTIVE AREA(ACRES) = 10.10 AREA-AVERAGED Fm(INCH/HR) = 0.06  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.23  
TOTAL AREA(ACRES) = 10.1 PEAK FLOW RATE(CFS) = 28.79

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH( FEET) = 0.52 HALFSTREET FLOOD WIDTH( FEET) = 20.12  
FLOW VELOCITY( FEET/SEC.) = 3.78 DEPTH\*VELOCITY( FT\*FT/SEC.) = 1.97  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 322.00 = 690.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 322.00 TO NODE 323.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM( FEET) = 628.00 DOWNSTREAM( FEET) = 624.00  
FLOW LENGTH( FEET) = 750.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.0 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC.) = 6.83  
ESTIMATED PIPE DIAMETER( INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 28.79  
PIPE TRAVEL TIME( MIN.) = 1.83 Tc( MIN.) = 12.02  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 323.00 = 1440.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 323.00 TO NODE 323.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

MAINLINE Tc( MIN.) = 12.02  
\* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 2.936  
SUBAREA LOSS RATE DATA( AMC II):

C1-22

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
PUBLIC PARK C 2.00 0.25 0.850 69  
PUBLIC PARK D 2.10 0.20 0.850 75  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" C 5.60 0.25 0.200 69  
RESIDENTIAL  
"11+ DWELLINGS/ACRE" D 0.90 0.20 0.200 75  
SCHOOL C 3.10 0.25 0.600 69  
SCHOOL D 0.30 0.20 0.600 75  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.488  
SUBAREA AREA(ACRES) = 14.00 SUBAREA RUNOFF(CFS) = 35.56  
EFFECTIVE AREA(ACRES) = 24.10 AREA-AVERAGED Fm(INCH/HR) = 0.09  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.38  
TOTAL AREA(ACRES) = 24.1 PEAK FLOW RATE(CFS) = 61.74

\*\*\*\*\*  
FLOW PROCESS FROM NODE 323.00 TO NODE 323.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

MAINLINE Tc( MIN.) = 12.02  
\* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 2.936

C1-22

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
APARTMENTS C 0.10 0.25 0.200 69  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200  
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.26  
EFFECTIVE AREA(ACRES) = 24.20 AREA-AVERAGED Fm(INCH/HR) = 0.09  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.38  
TOTAL AREA(ACRES) = 24.2 PEAK FLOW RATE(CFS) = 62.00

\*\*\*\*\*  
FLOW PROCESS FROM NODE 323.00 TO NODE 324.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM( FEET) = 624.00 DOWNSTREAM( FEET) = 614.00  
FLOW LENGTH( FEET) = 887.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.3 INCHES  
PIPE-FLOW VELOCITY( FEET/SEC.) = 10.79  
ESTIMATED PIPE DIAMETER( INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW( CFS) = 62.00  
PIPE TRAVEL TIME( MIN.) = 1.37 Tc( MIN.) = 13.39  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 324.00 = 2327.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

MAINLINE Tc( MIN.) = 13.39  
\* 25 YEAR RAINFALL INTENSITY( INCH/HR) = 2.762  
SUBAREA LOSS RATE DATA( AMC II):

C1-23

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	C	1.10	0.25	0.100	69
COMMERCIAL	D	1.10	0.20	0.100	75
PUBLIC PARK	C	3.10	0.25	0.850	69
PUBLIC PARK	D	2.60	0.20	0.850	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	4.80	0.25	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	3.40	0.20	0.200	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.416  
SUBAREA AREA (ACRES) = 16.10 SUBAREA RUNOFF (CFS) = 38.65  
EFFECTIVE AREA (ACRES) = 40.30 AREA-AVERAGED Fm (INCH/HR) = 0.09  
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.39  
TOTAL AREA (ACRES) = 40.3 PEAK FLOW RATE (CFS) = 96.86

\*\*\*\*\*

FLOW PROCESS FROM NODE 324.00 TO NODE 325.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 614.00 DOWNSTREAM(FEET) = 571.00  
FLOW LENGTH(FEET) = 1805.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.2 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.75  
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 96.86  
PIPE TRAVEL TIME(MIN.) = 1.91 Tc(MIN.) = 15.30  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 325.00 = 4132.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 15.30  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.561

**C1-24**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	3.10	0.25	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	5.00	0.20	0.200	75
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.20	0.25	0.900	69
RESIDENTIAL					
".4 DWELLING/ACRE"	D	1.20	0.20	0.900	75
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	13.90	0.25	0.500	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	D	18.60	0.20	0.500	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455  
SUBAREA AREA (ACRES) = 42.00 SUBAREA RUNOFF (CFS) = 93.03  
EFFECTIVE AREA (ACRES) = 82.30 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.42

TOTAL AREA (ACRES) = 82.3 PEAK FLOW RATE (CFS) = 182.60

\*\*\*\*\*

FLOW PROCESS FROM NODE 325.00 TO NODE 326.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 571.00 DOWNSTREAM(FEET) = 497.00  
FLOW LENGTH(FEET) = 1090.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.82  
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 182.60  
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 15.95  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 326.00 = 5222.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 15.95  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.502

**C1-25**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.00	0.30	0.100	56
COMMERCIAL	C	6.10	0.25	0.100	69
COMMERCIAL	D	12.90	0.20	0.100	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.30	0.20	0.200	75
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.90	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	C	12.80	0.25	0.900	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.423  
SUBAREA AREA (ACRES) = 34.00 SUBAREA RUNOFF (CFS) = 73.33  
EFFECTIVE AREA (ACRES) = 116.30 AREA-AVERAGED Fm (INCH/HR) = 0.10  
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.42  
TOTAL AREA (ACRES) = 116.3 PEAK FLOW RATE (CFS) = 251.50

\*\*\*\*\*

FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 15.95  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.502

**C1-25**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	D	23.20	0.20	0.900	75
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	0.30	0.25	0.500	69
RESIDENTIAL					

"5-7 DWELLINGS/ACRE" D 0.30 0.20 0.500 75  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.890  
 SUBAREA AREA (ACRES) = 23.80 SUBAREA RUNOFF (CFS) = 49.76  
 EFFECTIVE AREA (ACRES) = 140.10 AREA-AVERAGED Fm (INCH/HR) = 0.11  
 AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.50  
 TOTAL AREA (ACRES) = 140.1 PEAK FLOW RATE (CFS) = 301.26

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 326.00 TO NODE 327.00 IS CODE = 31

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

-----  
 ELEVATION DATA: UPSTREAM (FEET) = 497.00 DOWNSTREAM (FEET) = 445.00  
 FLOW LENGTH (FEET) = 1732.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.3 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 23.09  
 ESTIMATED PIPE DIAMETER (INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 301.26  
 PIPE TRAVEL TIME (MIN.) = 1.25 Tc (MIN.) = 17.20  
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 327.00 = 6954.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 327.00 TO NODE 327.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<<

-----  
 MAINLINE Tc (MIN.) = 17.20  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.397

**C1-26**

SUBAREA LOSS RATE DATA (AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	4.80	0.25	0.100	69
COMMERCIAL	D	4.80	0.20	0.100	75
PUBLIC PARK	C	0.10	0.25	0.850	69
PUBLIC PARK	D	6.30	0.20	0.850	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.00	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	43.30	0.25	0.200	69

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.250  
 SUBAREA AREA (ACRES) = 64.30 SUBAREA RUNOFF (CFS) = 135.32  
 EFFECTIVE AREA (ACRES) = 204.40 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA (ACRES) = 204.4 PEAK FLOW RATE (CFS) = 423.39

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 327.00 TO NODE 327.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<<

-----  
 MAINLINE Tc (MIN.) = 17.20  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.397

**C1-26**

SUBAREA LOSS RATE DATA (AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
-------------------------------	-------------------	-----------------	-----------------	-----------------	-----------

RESIDENTIAL  
 "11+ DWELLINGS/ACRE" D 38.70 0.20 0.200 75  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" C 2.30 0.25 0.900 69  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" D 3.60 0.20 0.900 75  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.21  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.293  
 SUBAREA AREA (ACRES) = 44.60 SUBAREA RUNOFF (CFS) = 93.77  
 EFFECTIVE AREA (ACRES) = 249.00 AREA-AVERAGED Fm (INCH/HR) = 0.09  
 AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.40  
 TOTAL AREA (ACRES) = 249.0 PEAK FLOW RATE (CFS) = 517.17

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 327.00 TO NODE 328.00 IS CODE = 31

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

-----  
 ELEVATION DATA: UPSTREAM (FEET) = 445.00 DOWNSTREAM (FEET) = 338.00  
 FLOW LENGTH (FEET) = 2664.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.5 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 29.55  
 ESTIMATED PIPE DIAMETER (INCH) = 63.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 517.17  
 PIPE TRAVEL TIME (MIN.) = 1.50 Tc (MIN.) = 18.70  
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 328.00 = 9618.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 328.00 TO NODE 328.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<<

-----  
 MAINLINE Tc (MIN.) = 18.70  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.286

**C1-27**

SUBAREA LOSS RATE DATA (AMC II):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	A	0.50	0.40	0.200	32
APARTMENTS	B	14.80	0.30	0.200	56
APARTMENTS	C	1.90	0.25	0.200	69
APARTMENTS	D	9.90	0.20	0.200	75
COMMERCIAL	A	1.80	0.40	0.100	32
COMMERCIAL	B	8.40	0.30	0.100	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.27  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.173  
 SUBAREA AREA (ACRES) = 37.30 SUBAREA RUNOFF (CFS) = 75.17  
 EFFECTIVE AREA (ACRES) = 286.30 AREA-AVERAGED Fm (INCH/HR) = 0.08  
 AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.37  
 TOTAL AREA (ACRES) = 286.3 PEAK FLOW RATE (CFS) = 567.47

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 328.00 TO NODE 328.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<<

-----  
 MAINLINE Tc (MIN.) = 18.70  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.286

**C1-27**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	7.60	0.25	0.100	69
COMMERCIAL	D	14.00	0.20	0.100	75
PUBLIC PARK	C	1.40	0.25	0.850	69
PUBLIC PARK	D	0.30	0.20	0.850	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	0.20	0.40	0.200	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.30	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.156  
SUBAREA AREA(ACRES) = 23.80 SUBAREA RUNOFF(CFS) = 48.20  
EFFECTIVE AREA(ACRES) = 310.10 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 310.1 PEAK FLOW RATE(CFS) = 615.67

\*\*\*\*\*  
FLOW PROCESS FROM NODE 328.00 TO NODE 328.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 18.70  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.286 **C1-27**  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	12.20	0.25	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	17.60	0.20	0.200	75
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.90	0.25	0.900	69
RESIDENTIAL					
".4 DWELLING/ACRE"	D	9.30	0.20	0.900	75
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.20	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.383  
SUBAREA AREA(ACRES) = 40.50 SUBAREA RUNOFF(CFS) = 80.35  
EFFECTIVE AREA(ACRES) = 350.60 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.36  
TOTAL AREA(ACRES) = 350.6 PEAK FLOW RATE(CFS) = 696.03

\*\*\*\*\*  
FLOW PROCESS FROM NODE 328.00 TO NODE 328.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 18.70  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.286 **C1-27**  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					

"5-7 DWELLINGS/ACRE"	C	5.30	0.25	0.500	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	D	28.30	0.20	0.500	75
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	3.80	0.25	0.400	69
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	4.10	0.20	0.400	75
SCHOOL	C	0.30	0.25	0.600	69
SCHOOL	D	0.30	0.20	0.600	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.483  
SUBAREA AREA(ACRES) = 42.10 SUBAREA RUNOFF(CFS) = 82.76  
EFFECTIVE AREA(ACRES) = 392.70 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.37  
TOTAL AREA(ACRES) = 392.7 PEAK FLOW RATE(CFS) = 778.79

\*\*\*\*\*  
FLOW PROCESS FROM NODE 328.00 TO NODE 329.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 338.00 DOWNSTREAM(FEET) = 320.00  
FLOW LENGTH(FEET) = 1154.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 87.0 INCH PIPE IS 66.8 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.88  
ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 778.79  
PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 19.54  
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 329.00 = 10772.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 329.00 TO NODE 329.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc(MIN.) = 19.54 **C1-28**  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.230  
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	11.60	0.40	0.100	32
COMMERCIAL	B	6.70	0.30	0.100	56
COMMERCIAL	C	12.80	0.25	0.100	69
RESIDENTIAL					
".4 DWELLING/ACRE"	A	0.20	0.40	0.900	32
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.32  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.110  
SUBAREA AREA(ACRES) = 31.50 SUBAREA RUNOFF(CFS) = 62.22  
EFFECTIVE AREA(ACRES) = 424.20 AREA-AVERAGED Fm(INCH/HR) = 0.08  
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 424.2 PEAK FLOW RATE(CFS) = 821.16

\*\*\*\*\*  
FLOW PROCESS FROM NODE 329.00 TO NODE 330.00 IS CODE = 31  
-----

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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 320.00 DOWNSTREAM(FEET) = 310.00
FLOW LENGTH(FEET) = 1981.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 108.0 INCH PIPE IS 86.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.08
ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 821.16
PIPE TRAVEL TIME(MIN.) = 2.19 Tc(MIN.) = 21.73
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 330.00 = 12753.00 FEET.

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*****
FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 21.73
RAINFALL INTENSITY(INCH/HR) = 2.10
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.35
EFFECTIVE STREAM AREA(ACRES) = 424.20
TOTAL STREAM AREA(ACRES) = 424.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 821.16

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*****
FLOW PROCESS FROM NODE 390.00 TO NODE 391.00 IS CODE = 21
-----

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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 317.00
ELEVATION DATA: UPSTREAM(FEET) = 860.00 DOWNSTREAM(FEET) = 775.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.195
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.417
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS    Tc
  LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" C        0.20    0.25    1.000    81    9.20
NATURAL FAIR COVER
"OPEN BRUSH"          C        1.20    0.25    1.000    77    9.20
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 3.99
TOTAL AREA(ACRES) = 1.40 PEAK FLOW RATE(CFS) = 3.99

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*****
FLOW PROCESS FROM NODE 391.00 TO NODE 392.00 IS CODE = 51
-----

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```

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

```

OC1-1

```

ELEVATION DATA: UPSTREAM(FEET) = 775.00 DOWNSTREAM(FEET) = 700.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 545.00 CHANNEL SLOPE = 0.1376
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.136
SUBAREA LOSS RATE DATA(AMC II):

```

OC1-2

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DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
  LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" C        1.70    0.25    1.000    81
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" D        0.60    0.20    1.000    86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.99
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.05
AVERAGE FLOW DEPTH(FEET) = 0.62 TRAVEL TIME(MIN.) = 1.50
Tc(MIN.) = 10.70
SUBAREA AREA(ACRES) = 2.30 SUBAREA RUNOFF(CFS) = 6.00
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 9.64

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.70 FLOW VELOCITY(FEET/SEC.) = 6.61
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 392.00 = 862.00 FEET.

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*****
FLOW PROCESS FROM NODE 392.00 TO NODE 393.00 IS CODE = 51
-----

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```

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

```

```

ELEVATION DATA: UPSTREAM(FEET) = 700.00 DOWNSTREAM(FEET) = 635.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1093.00 CHANNEL SLOPE = 0.0595
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.758
SUBAREA LOSS RATE DATA(AMC II):

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OC1-3

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DEVELOPMENT TYPE/    SCS SOIL    AREA    Fp    Ap    SCS
  LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" C        1.40    0.25    1.000    75
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" C        8.40    0.25    1.000    81
NATURAL FAIR COVER
"OPEN BRUSH"          C        2.70    0.25    1.000    77
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" D        0.40    0.20    1.000    81
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" D        9.20    0.20    1.000    86
NATURAL FAIR COVER
"OPEN BRUSH"          D        0.60    0.20    1.000    83

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 35.56
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.68
AVERAGE FLOW DEPTH(FEET) = 1.33 TRAVEL TIME(MIN.) = 2.73

```

Tc(MIN.) = 13.42  
SUBAREA AREA(ACRES) = 22.70 SUBAREA RUNOFF(CFS) = 51.70  
EFFECTIVE AREA(ACRES) = 26.40 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 26.4 PEAK FLOW RATE(CFS) = 60.08

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 1.62 FLOW VELOCITY(FEET/SEC.) = 7.61  
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 393.00 = 1955.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 393.00 TO NODE 394.00 IS CODE = 51  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 635.00 DOWNSTREAM(FEET) = 598.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 904.00 CHANNEL SLOPE = 0.0409  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.537

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
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NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	1.60	0.25	1.000	75
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	C	5.50	0.25	1.000	81
NATURAL FAIR COVER					
"OPEN BRUSH"	C	1.80	0.25	1.000	77
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	0.60	0.25	1.000	77
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	1.00	0.20	1.000	81
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	D	6.80	0.20	1.000	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 78.07

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.06

AVERAGE FLOW DEPTH(FEET) = 1.92 TRAVEL TIME(MIN.) = 2.13

Tc(MIN.) = 15.56

SUBAREA AREA(ACRES) = 17.30 SUBAREA RUNOFF(CFS) = 35.96

EFFECTIVE AREA(ACRES) = 43.70 AREA-AVERAGED Fm(INCH/HR) = 0.23

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 43.7 PEAK FLOW RATE(CFS) = 90.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 2.03 FLOW VELOCITY(FEET/SEC.) = 7.33  
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 394.00 = 2859.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 394.00 TO NODE 394.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----

MAINLINE Tc(MIN.) = 15.56

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.537

OC1-4

SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/  
LAND USE

SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
-------------------	-----------------	-----------------	-----------------	-----------

NATURAL FAIR COVER  
"OPEN BRUSH" D 2.50 0.20 1.000 83  
NATURAL FAIR COVER  
"WOODLAND,GRASS" D 0.10 0.20 1.000 82  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 5.47  
EFFECTIVE AREA(ACRES) = 46.30 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 46.3 PEAK FLOW RATE(CFS) = 96.26

\*\*\*\*\*  
FLOW PROCESS FROM NODE 394.00 TO NODE 395.00 IS CODE = 51  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 598.00 DOWNSTREAM(FEET) = 573.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 701.00 CHANNEL SLOPE = 0.0357  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.406

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
-------------------------------	-------------------	-----------------	-----------------	-----------------	-----------

NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	6.30	0.25	1.000	75
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	0.20	0.20	1.000	81
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	C	5.90	0.25	1.000	81
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	D	12.70	0.20	1.000	86
NATURAL FAIR COVER					
"OPEN BRUSH"	C	6.80	0.25	1.000	77
NATURAL FAIR COVER					
"OPEN BRUSH"	D	3.20	0.20	1.000	83

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 130.68

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.62

AVERAGE FLOW DEPTH(FEET) = 2.39 TRAVEL TIME(MIN.) = 1.53

Tc(MIN.) = 17.09

SUBAREA AREA(ACRES) = 35.10 SUBAREA RUNOFF(CFS) = 68.82

EFFECTIVE AREA(ACRES) = 81.40 AREA-AVERAGED Fm(INCH/HR) = 0.23

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 81.4 PEAK FLOW RATE(CFS) = 159.61

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 2.58 FLOW VELOCITY(FEET/SEC.) = 8.02  
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 395.00 = 3560.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 395.00 TO NODE 395.00 IS CODE = 81  
-----

OC1-5

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 17.09

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.406 **OC1-5**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	C	1.00	0.25	0.900	69
RESIDENTIAL					
".4 DWELLING/ACRE"	D	2.70	0.20	0.900	75
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	0.50	0.25	1.000	77
NATURAL FAIR COVER					
"WOODLAND,GRASS"	D	0.10	0.20	1.000	82

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.914

SUBAREA AREA(ACRES) = 4.30 SUBAREA RUNOFF(CFS) = 8.54

EFFECTIVE AREA(ACRES) = 85.70 AREA-AVERAGED Fm(INCH/HR) = 0.23

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 85.7 PEAK FLOW RATE(CFS) = 168.15

\*\*\*\*\*

FLOW PROCESS FROM NODE 395.00 TO NODE 370.00 IS CODE = 31

-----

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 573.00 DOWNSTREAM(FEET) = 437.00

FLOW LENGTH(FEET) = 6286.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.7 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 17.42

ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 168.15

PIPE TRAVEL TIME(MIN.) = 6.01 Tc(MIN.) = 23.11

LONGEST FLOWPATH FROM NODE 390.00 TO NODE 370.00 = 9846.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 370.00 TO NODE 371.00 IS CODE = 51

-----

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

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 437.00 DOWNSTREAM(FEET) = 345.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 1963.00 CHANNEL SLOPE = 0.0469

CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000

MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00 **OC1-6**

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.868

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	A	0.50	0.40	1.000	40
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	0.60	0.25	1.000	75
COMMERCIAL	A	1.50	0.40	0.100	32
COMMERCIAL	B	0.70	0.30	0.100	56
COMMERCIAL	C	1.60	0.25	0.100	69

COMMERCIAL D 1.10 0.20 0.100 75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.31

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.265

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 172.97

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.06

AVERAGE FLOW DEPTH(FEET) = 2.52 TRAVEL TIME(MIN.) = 3.61

Tc(MIN.) = 26.72

SUBAREA AREA(ACRES) = 6.00 SUBAREA RUNOFF(CFS) = 9.64

EFFECTIVE AREA(ACRES) = 91.70 AREA-AVERAGED Fm(INCH/HR) = 0.22

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.95

TOTAL AREA(ACRES) = 91.7 PEAK FLOW RATE(CFS) = 168.15

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 2.50 FLOW VELOCITY(FEET/SEC.) = 8.98

LONGEST FLOWPATH FROM NODE 390.00 TO NODE 371.00 = 11809.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 26.72 **OC1-6**

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.868

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"GRASS"	A	1.40	0.40	1.000	50
NATURAL FAIR COVER					
"GRASS"	C	2.80	0.25	1.000	79
NATURAL FAIR COVER					
"GRASS"	D	0.10	0.20	1.000	84
NATURAL FAIR COVER					
"OPEN BRUSH"	A	0.40	0.40	1.000	46
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	C	3.40	0.25	1.000	77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA AREA(ACRES) = 8.40 SUBAREA RUNOFF(CFS) = 11.98

EFFECTIVE AREA(ACRES) = 100.10 AREA-AVERAGED Fm(INCH/HR) = 0.22

AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.95

TOTAL AREA(ACRES) = 100.1 PEAK FLOW RATE(CFS) = 168.15

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 26.72 **OC1-6**

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.868

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					

```

"OPEN BRUSH"          D      0.80   0.20   1.000   83
PUBLIC PARK           A      0.10   0.40   0.850   32
PUBLIC PARK           C      3.80   0.25   0.850   69
PUBLIC PARK           D      2.50   0.20   0.850   75
RESIDENTIAL
".4 DWELLING/ACRE"    A      2.40   0.40   0.900   32
RESIDENTIAL
".4 DWELLING/ACRE"    B      0.70   0.30   0.900   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.877
SUBAREA AREA(ACRES) = 10.30   SUBAREA RUNOFF(CFS) = 15.09
EFFECTIVE AREA(ACRES) = 110.40   AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.24   AREA-AVERAGED Ap = 0.95
TOTAL AREA(ACRES) = 110.4   PEAK FLOW RATE(CFS) = 168.15
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

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```

MAINLINE Tc(MIN.) = 26.72
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.868
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
".4 DWELLING/ACRE"  C      3.50   0.25  0.900  69
RESIDENTIAL
".4 DWELLING/ACRE"  D      1.10   0.20  0.900  75
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C      0.10   0.25  0.400  69
NATURAL FAIR COVER
"WOODLAND,GRASS"    B      0.20   0.30  1.000  65
NATURAL FAIR COVER
"WOODLAND,GRASS"    C      1.90   0.25  1.000  77
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.924
SUBAREA AREA(ACRES) = 6.80   SUBAREA RUNOFF(CFS) = 10.06
EFFECTIVE AREA(ACRES) = 117.20   AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.24   AREA-AVERAGED Ap = 0.94
TOTAL AREA(ACRES) = 117.2   PEAK FLOW RATE(CFS) = 173.46

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OC1-6

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FLOW PROCESS FROM NODE 371.00 TO NODE 330.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

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```

ELEVATION DATA: UPSTREAM(FEET) = 345.00 DOWNSTREAM(FEET) = 310.00
FLOW LENGTH(FEET) = 1065.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.07
ESTIMATED PIPE DIAMETER(INCH) = 45.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 173.46
PIPE TRAVEL TIME(MIN.) = 0.84   Tc(MIN.) = 27.56
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 330.00 = 12874.00 FEET.

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FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====

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```

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 27.56
RAINFALL INTENSITY(INCH/HR) = 1.84
AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.24
AREA-AVERAGED Ap = 0.94
EFFECTIVE STREAM AREA(ACRES) = 117.20
TOTAL STREAM AREA(ACRES) = 117.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 173.46

```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	419.25	18.02	2.335	0.22( 0.08)	0.37	204.2	310.00
1	399.74	21.62	2.106	0.22( 0.08)	0.37	217.1	300.00
2	821.16	21.73	2.100	0.22( 0.08)	0.35	424.2	320.00
3	173.46	27.56	1.836	0.24( 0.22)	0.94	117.2	390.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1327.70	18.02	2.335	0.23( 0.10)	0.43	632.4	310.00
2	1378.03	21.62	2.106	0.23( 0.10)	0.43	731.0	300.00
3	1378.88	21.73	2.100	0.23( 0.10)	0.43	733.7	320.00
4	1233.67	27.56	1.836	0.23( 0.10)	0.45	758.5	390.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 1378.88   Tc(MIN.) = 21.73
EFFECTIVE AREA(ACRES) = 733.73   AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.23   AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 758.5
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 330.00 = 12874.00 FEET.

```

\*\*\*\*\*

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FLOW PROCESS FROM NODE 330.00 TO NODE 331.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

```

```

ELEVATION DATA: UPSTREAM(FEET) = 310.00 DOWNSTREAM(FEET) = 280.00
FLOW LENGTH(FEET) = 374.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 62.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 48.39
ESTIMATED PIPE DIAMETER(INCH) = 78.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1378.88
PIPE TRAVEL TIME(MIN.) = 0.13   Tc(MIN.) = 21.86
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 331.00 = 13248.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.86
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.093
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
APARTMENTS          A        17.50    0.40     0.200   32
APARTMENTS          B         1.50    0.30     0.200   56
APARTMENTS          C         0.70    0.25     0.200   69
NATURAL POOR COVER
"BARREN"            D         0.10    0.20     1.000   93
COMMERCIAL          A        44.60    0.40     0.100   32
COMMERCIAL          B         0.70    0.30     0.100   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.39
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.132
SUBAREA AREA(ACRES) = 65.10 SUBAREA RUNOFF(CFS) = 119.60
EFFECTIVE AREA(ACRES) = 798.83 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 823.6 PEAK FLOW RATE(CFS) = 1436.65

*****
FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 21.86
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.093
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
COMMERCIAL          C         2.00    0.25     0.100   69
COMMERCIAL          D         4.10    0.20     0.100   75
NATURAL FAIR COVER
"WOODLAND,GRASS"   D         0.10    0.20     1.000   82
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.115
SUBAREA AREA(ACRES) = 6.20 SUBAREA RUNOFF(CFS) = 11.54
EFFECTIVE AREA(ACRES) = 805.03 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 829.8 PEAK FLOW RATE(CFS) = 1448.20

*****
FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 13
-----
>>>>CLEAR THE MAIN-STREAM MEMORY<<<<
=====
*****

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FLOW PROCESS FROM NODE 400.00 TO NODE 401.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 314.00
ELEVATION DATA: UPSTREAM(FEET) = 618.00 DOWNSTREAM(FEET) = 590.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.048
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.331
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS  Tc
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C        1.20    0.25     0.400   69  6.05
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA RUNOFF(CFS) = 4.57
TOTAL AREA(ACRES) = 1.20 PEAK FLOW RATE(CFS) = 4.57

*****
FLOW PROCESS FROM NODE 401.00 TO NODE 402.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 590.00 DOWNSTREAM ELEVATION(FEET) = 588.00
STREET LENGTH(FEET) = 274.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.19
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 18.63
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.29
STREET FLOW TRAVEL TIME(MIN.) = 1.75 Tc(MIN.) = 7.80
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.751
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE" C        3.30    0.25     0.600   69
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C        4.40    0.25     0.400   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.486
SUBAREA AREA(ACRES) = 7.70 SUBAREA RUNOFF(CFS) = 25.15

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EFFECTIVE AREA(ACRES) = 8.90 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.47  
TOTAL AREA(ACRES) = 8.9 PEAK FLOW RATE(CFS) = 29.10

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 22.93  
FLOW VELOCITY(FEET/SEC.) = 2.98 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.70  
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.00 = 588.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 402.00 TO NODE 403.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 588.00 DOWNSTREAM(FEET) = 581.00  
FLOW LENGTH(FEET) = 805.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.22  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 29.10  
PIPE TRAVEL TIME(MIN.) = 1.63 Tc(MIN.) = 9.43  
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 1393.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 403.00 TO NODE 403.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.43  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.368

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	C	0.10	0.25	1.000	77
RESIDENTIAL					
"4 DWELLING/ACRE"	C	2.00	0.25	0.900	69
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	8.80	0.25	0.600	69
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.10	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	4.90	0.25	0.400	69

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.577  
SUBAREA AREA(ACRES) = 15.90 SUBAREA RUNOFF(CFS) = 46.13  
EFFECTIVE AREA(ACRES) = 24.80 AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.54  
TOTAL AREA(ACRES) = 24.8 PEAK FLOW RATE(CFS) = 72.16

\*\*\*\*\*

FLOW PROCESS FROM NODE 403.00 TO NODE 403.00 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) = 3.37  
AREA-AVERAGED Fm(INCH/HR) = 0.14  
AREA-AVERAGED Fp(INCH/HR) = 0.25  
AREA-AVERAGED Ap = 0.54  
EFFECTIVE STREAM AREA(ACRES) = 24.80  
TOTAL STREAM AREA(ACRES) = 24.80  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 72.16

\*\*\*\*\*

FLOW PROCESS FROM NODE 430.00 TO NODE 431.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 329.00  
ELEVATION DATA: UPSTREAM(FEET) = 725.00 DOWNSTREAM(FEET) = 630.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.196  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.417

OC2-1

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER						
"CHAPARRAL,NARROWLEAF"	C	0.10	0.25	1.000	81	9.20
NATURAL FAIR COVER						
"OPEN BRUSH"	C	1.30	0.25	1.000	77	9.20
NATURAL FAIR COVER						
"OPEN BRUSH"	D	0.10	0.20	1.000	83	9.20

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA RUNOFF(CFS) = 4.28  
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 4.28

\*\*\*\*\*

FLOW PROCESS FROM NODE 431.00 TO NODE 432.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 630.00 DOWNSTREAM(FEET) = 597.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 196.00 CHANNEL SLOPE = 0.1684  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.316

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	D	0.10	0.20	1.000	86
NATURAL FAIR COVER					
"OPEN BRUSH"	C	1.70	0.25	1.000	77
NATURAL FAIR COVER					
"OPEN BRUSH"	D	0.10	0.20	1.000	83

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.91

OC2-2

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.56  
 AVERAGE FLOW DEPTH (FEET) = 0.59 TRAVEL TIME (MIN.) = 0.50  
 Tc (MIN.) = 9.69  
 SUBAREA AREA (ACRES) = 1.90 SUBAREA RUNOFF (CFS) = 5.25  
 EFFECTIVE AREA (ACRES) = 3.40 AREA-AVERAGED Fm (INCH/HR) = 0.25  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA (ACRES) = 3.4 PEAK FLOW RATE (CFS) = 9.40

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH (FEET) = 0.67 FLOW VELOCITY (FEET/SEC.) = 7.05  
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 432.00 = 525.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 432.00 TO NODE 433.00 IS CODE = 51  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM (FEET) = 597.00 DOWNSTREAM (FEET) = 582.00  
 CHANNEL LENGTH THRU SUBAREA (FEET) = 520.00 CHANNEL SLOPE = 0.0288  
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 20.00  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.977

OC2-3

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	C	3.70	0.25	1.000	77
RESIDENTIAL ".4 DWELLING/ACRE"	C	1.20	0.25	0.900	69
RESIDENTIAL "3-4 DWELLINGS/ACRE"	C	1.20	0.25	0.600	69
NATURAL FAIR COVER "WOODLAND, GRASS"	C	0.30	0.25	1.000	77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.906  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 17.33  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.26  
 AVERAGE FLOW DEPTH (FEET) = 1.16 TRAVEL TIME (MIN.) = 2.03  
 Tc (MIN.) = 11.73  
 SUBAREA AREA (ACRES) = 6.40 SUBAREA RUNOFF (CFS) = 15.84  
 EFFECTIVE AREA (ACRES) = 9.80 AREA-AVERAGED Fm (INCH/HR) = 0.23  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.94  
 TOTAL AREA (ACRES) = 9.8 PEAK FLOW RATE (CFS) = 24.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH (FEET) = 1.32 FLOW VELOCITY (FEET/SEC.) = 4.61  
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.00 = 1045.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 433.00 TO NODE 403.00 IS CODE = 31  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM (FEET) = 582.00 DOWNSTREAM (FEET) = 581.00  
 FLOW LENGTH (FEET) = 10.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.8 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 19.66  
 ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 24.20  
 PIPE TRAVEL TIME (MIN.) = 0.01 Tc (MIN.) = 11.74  
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 403.00 = 1055.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 403.00 TO NODE 403.00 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.) = 11.74  
 RAINFALL INTENSITY (INCH/HR) = 2.98  
 AREA-AVERAGED Fm (INCH/HR) = 0.23  
 AREA-AVERAGED Fp (INCH/HR) = 0.25  
 AREA-AVERAGED Ap = 0.94  
 EFFECTIVE STREAM AREA (ACRES) = 9.80  
 TOTAL STREAM AREA (ACRES) = 9.80  
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 24.20

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	72.16	9.43	3.368	0.25 (0.14)	0.54	24.8	400.00
2	24.20	11.74	2.976	0.25 (0.23)	0.94	9.8	430.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	94.39	9.43	3.368	0.25 (0.16)	0.64	32.7	400.00
2	87.61	11.74	2.976	0.25 (0.16)	0.65	34.6	430.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE (CFS) = 94.39 Tc (MIN.) = 9.43  
 EFFECTIVE AREA (ACRES) = 32.68 AREA-AVERAGED Fm (INCH/HR) = 0.16  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.64  
 TOTAL AREA (ACRES) = 34.6  
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 1393.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 403.00 TO NODE 404.00 IS CODE = 31  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM (FEET) = 581.00 DOWNSTREAM (FEET) = 570.00  
 FLOW LENGTH (FEET) = 1056.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 33.3 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 11.54  
 ESTIMATED PIPE DIAMETER (INCH) = 42.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 94.39  
 PIPE TRAVEL TIME (MIN.) = 1.53 Tc (MIN.) = 10.96

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 404.00 = 2449.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.96

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.094

C2-4

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.10	0.25	0.100	69
COMMERCIAL	D	0.10	0.20	0.100	75
NATURAL FAIR COVER "OPEN BRUSH"	C	0.10	0.25	1.000	77
RESIDENTIAL ".4 DWELLING/ACRE"	C	4.90	0.25	0.900	69
RESIDENTIAL ".4 DWELLING/ACRE"	D	1.50	0.20	0.900	75
RESIDENTIAL "3-4 DWELLINGS/ACRE"	C	1.00	0.25	0.600	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.842

SUBAREA AREA(ACRES) = 7.70 SUBAREA RUNOFF(CFS) = 20.05

EFFECTIVE AREA(ACRES) = 40.38 AREA-AVERAGED Fm(INCH/HR) = 0.17

AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.68

TOTAL AREA(ACRES) = 42.3 PEAK FLOW RATE(CFS) = 106.37

\*\*\*\*\*

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.96

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.094

C2-4

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	8.80	0.25	0.500	69
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	4.20	0.20	0.500	75
RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	1.10	0.25	0.400	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.492

SUBAREA AREA(ACRES) = 14.10 SUBAREA RUNOFF(CFS) = 37.80

EFFECTIVE AREA(ACRES) = 54.48 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.63

TOTAL AREA(ACRES) = 56.4 PEAK FLOW RATE(CFS) = 144.16

\*\*\*\*\*

FLOW PROCESS FROM NODE 404.00 TO NODE 405.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 570.00 DOWNSTREAM(FEET) = 565.00

FLOW LENGTH(FEET) = 1526.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 63.0 INCH PIPE IS 46.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 8.42

ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 144.16

PIPE TRAVEL TIME(MIN.) = 3.02 Tc(MIN.) = 13.98

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 405.00 = 3975.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.98

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.696

C2-5

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.10	0.25	0.100	69
PUBLIC PARK	C	1.80	0.25	0.850	69
PUBLIC PARK	D	0.40	0.20	0.850	75
RESIDENTIAL ".4 DWELLING/ACRE"	C	1.80	0.25	0.900	69
RESIDENTIAL ".4 DWELLING/ACRE"	D	2.80	0.20	0.900	75
RESIDENTIAL "5-7 DWELLINGS/ACRE"	C	6.10	0.25	0.500	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.698

SUBAREA AREA(ACRES) = 13.00 SUBAREA RUNOFF(CFS) = 29.63

EFFECTIVE AREA(ACRES) = 67.48 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.64

TOTAL AREA(ACRES) = 69.4 PEAK FLOW RATE(CFS) = 154.25

\*\*\*\*\*

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.98

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.696

C2-5

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "5-7 DWELLINGS/ACRE"	D	11.20	0.20	0.500	75
RESIDENTIAL "8-10 DWELLINGS/ACRE"	C	7.80	0.25	0.400	69
RESIDENTIAL "8-10 DWELLINGS/ACRE"	D	1.40	0.20	0.400	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455

SUBAREA AREA(ACRES) = 20.40 SUBAREA RUNOFF(CFS) = 47.68

EFFECTIVE AREA(ACRES) = 87.88 AREA-AVERAGED Fm(INCH/HR) = 0.14

AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.60

TOTAL AREA(ACRES) = 89.8 PEAK FLOW RATE(CFS) = 201.93

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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 406.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 565.00 DOWNSTREAM(FEET) = 495.00
FLOW LENGTH(FEET) = 2168.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.28
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 201.93
PIPE TRAVEL TIME(MIN.) = 1.70 Tc(MIN.) = 15.68
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 406.00 = 6143.00 FEET.
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*****
FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.68
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.526 C2-6
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 5.50 0.25 0.100 69
COMMERCIAL D 1.90 0.20 0.100 75
PUBLIC PARK C 2.50 0.25 0.850 69
PUBLIC PARK D 0.90 0.20 0.850 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 36.40 0.25 0.200 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 13.60 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.224
SUBAREA AREA(ACRES) = 60.80 SUBAREA RUNOFF(CFS) = 135.33
EFFECTIVE AREA(ACRES) = 148.68 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 150.6 PEAK FLOW RATE(CFS) = 323.87
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*****
FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.68
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.526 C2-6
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
".4 DWELLING/ACRE" C 4.70 0.25 0.900 69
RESIDENTIAL
".4 DWELLING/ACRE" D 2.10 0.20 0.900 75
RESIDENTIAL
"3-4 DWELLINGS/ACRE" C 0.10 0.25 0.600 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 0.30 0.25 0.500 69
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RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 0.10 0.20 0.500 75
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.10 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.868
SUBAREA AREA(ACRES) = 7.40 SUBAREA RUNOFF(CFS) = 15.47
EFFECTIVE AREA(ACRES) = 156.08 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 158.0 PEAK FLOW RATE(CFS) = 339.34
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*****
FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.68
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.526 C2-6
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C 9.30 0.25 0.400 69
RESIDENTIAL
"8-10 DWELLINGS/ACRE" D 0.90 0.20 0.400 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 10.20 SUBAREA RUNOFF(CFS) = 22.29
EFFECTIVE AREA(ACRES) = 166.28 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 168.2 PEAK FLOW RATE(CFS) = 361.63
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*****
FLOW PROCESS FROM NODE 406.00 TO NODE 407.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 495.00 DOWNSTREAM(FEET) = 395.00
FLOW LENGTH(FEET) = 2905.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.55
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 361.63
PIPE TRAVEL TIME(MIN.) = 1.90 Tc(MIN.) = 17.57
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 407.00 = 9048.00 FEET.
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```
*****
FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.57
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.368 C2-7
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS D 0.30 0.20 0.200 75
```

COMMERCIAL B 0.60 0.30 0.100 56  
 COMMERCIAL C 9.10 0.25 0.100 69  
 COMMERCIAL D 6.70 0.20 0.100 75  
 PUBLIC PARK C 0.50 0.25 0.850 69  
 PUBLIC PARK D 2.60 0.20 0.850 75  
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.22  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.219  
 SUBAREA AREA (ACRES) = 19.80 SUBAREA RUNOFF (CFS) = 41.36  
 EFFECTIVE AREA (ACRES) = 186.08 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.44  
 TOTAL AREA (ACRES) = 188.0 PEAK FLOW RATE (CFS) = 379.34

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 17.57 **C2-7**  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.368  
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	A	0.60	0.40	0.200	32
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.40	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	10.60	0.25	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.60	0.20	0.200	75
RESIDENTIAL					
".4 DWELLING/ACRE"	C	1.90	0.25	0.900	69
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.70	0.20	0.900	75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.308  
 SUBAREA AREA (ACRES) = 16.80 SUBAREA RUNOFF (CFS) = 34.64  
 EFFECTIVE AREA (ACRES) = 202.88 AREA-AVERAGED Fm (INCH/HR) = 0.10  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA (ACRES) = 204.8 PEAK FLOW RATE (CFS) = 413.98

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 17.57 **C2-7**  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.368  
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	14.30	0.25	0.600	69
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	15.30	0.20	0.600	75
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	A	0.40	0.40	0.500	32
RESIDENTIAL					

"5-7 DWELLINGS/ACRE" B 1.50 0.30 0.500 56  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" C 5.10 0.25 0.500 69  
 RESIDENTIAL  
 "5-7 DWELLINGS/ACRE" D 0.90 0.20 0.500 75  
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.579  
 SUBAREA AREA (ACRES) = 37.50 SUBAREA RUNOFF (CFS) = 75.42  
 EFFECTIVE AREA (ACRES) = 240.38 AREA-AVERAGED Fm (INCH/HR) = 0.11  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA (ACRES) = 242.3 PEAK FLOW RATE (CFS) = 489.39

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 17.57 **C2-7**  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.368  
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.50	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	8.40	0.25	0.400	69
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	2.80	0.20	0.400	75
SCHOOL	B	0.60	0.30	0.600	56
SCHOOL	C	1.50	0.25	0.600	69
SCHOOL	D	3.50	0.20	0.600	75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.455  
 SUBAREA AREA (ACRES) = 20.30 SUBAREA RUNOFF (CFS) = 41.25  
 EFFECTIVE AREA (ACRES) = 260.68 AREA-AVERAGED Fm (INCH/HR) = 0.11  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA (ACRES) = 262.6 PEAK FLOW RATE (CFS) = 530.64

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 407.00 TO NODE 430.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 395.00 DOWNSTREAM (FEET) = 372.00  
 FLOW LENGTH (FEET) = 661.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 66.0 INCH PIPE IS 48.6 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 28.28  
 ESTIMATED PIPE DIAMETER (INCH) = 66.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 530.64  
 PIPE TRAVEL TIME (MIN.) = 0.39 Tc (MIN.) = 17.96  
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 430.00 = 9709.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 430.00 TO NODE 430.00 IS CODE = 10

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

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*****
FLOW PROCESS FROM NODE 430.00 TO NODE 430.00 IS CODE = 13
-----
>>>>CLEAR THE MAIN-STREAM MEMORY<<<<
=====
*****
FLOW PROCESS FROM NODE 410.00 TO NODE 411.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH (FEET) = 328.00
ELEVATION DATA: UPSTREAM (FEET) = 535.00 DOWNSTREAM (FEET) = 495.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 6.368
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 4.207
SUBAREA Tc AND LOSS RATE DATA (AMC II):

```

**C2-10**

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
".4 DWELLING/ACRE"	D	0.50	0.20	0.900	75	7.53
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	D	0.20	0.20	0.600	75	6.37

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.814  
SUBAREA RUNOFF (CFS) = 2.55  
TOTAL AREA (ACRES) = 0.70 PEAK FLOW RATE (CFS) = 2.55

```

*****
FLOW PROCESS FROM NODE 411.00 TO NODE 412.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM (FEET) = 495.00 DOWNSTREAM (FEET) = 490.00
FLOW LENGTH (FEET) = 267.00 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.) = 5.91
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 2.55
PIPE TRAVEL TIME (MIN.) = 0.75 Tc (MIN.) = 7.12
LONGEST FLOWPATH FROM NODE 410.00 TO NODE 412.00 = 595.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc (MIN.) = 7.12
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.949
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL

```

**C2-11**

".4 DWELLING/ACRE"	C	0.90	0.25	0.900	69
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.30	0.20	0.900	75
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	0.10	0.20	0.600	75
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	C	0.10	0.25	0.500	69
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	D	0.30	0.20	0.500	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.788  
SUBAREA AREA (ACRES) = 1.70 SUBAREA RUNOFF (CFS) = 5.76  
EFFECTIVE AREA (ACRES) = 2.40 AREA-AVERAGED Fm (INCH/HR) = 0.18  
AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.80  
TOTAL AREA (ACRES) = 2.4 PEAK FLOW RATE (CFS) = 8.15

```

*****
FLOW PROCESS FROM NODE 412.00 TO NODE 413.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM (FEET) = 490.00 DOWNSTREAM (FEET) = 480.00
FLOW LENGTH (FEET) = 520.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.9 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 8.14
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 8.15
PIPE TRAVEL TIME (MIN.) = 1.06 Tc (MIN.) = 8.18
LONGEST FLOWPATH FROM NODE 410.00 TO NODE 413.00 = 1115.00 FEET.

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*****
FLOW PROCESS FROM NODE 413.00 TO NODE 413.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc (MIN.) = 8.18
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.650
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES)  (INCH/HR) (DECIMAL) CN
RESIDENTIAL
".4 DWELLING/ACRE"      C          2.00      0.25      0.900      69
RESIDENTIAL
".4 DWELLING/ACRE"      D          0.40      0.20      0.900      75
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    C          0.40      0.25      0.500      69
RESIDENTIAL
"5-7 DWELLINGS/ACRE"    D          0.30      0.20      0.500      75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.810
SUBAREA AREA (ACRES) = 3.10 SUBAREA RUNOFF (CFS) = 9.64
EFFECTIVE AREA (ACRES) = 5.50 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.80
TOTAL AREA (ACRES) = 5.5 PEAK FLOW RATE (CFS) = 17.14

```

**C2-12**

FLOW PROCESS FROM NODE 413.00 TO NODE 414.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 480.00 DOWNSTREAM(FEET) = 470.00
FLOW LENGTH(FEET) = 310.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.53
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.14
PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 8.63
LONGEST FLOWPATH FROM NODE 410.00 TO NODE 414.00 = 1425.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 414.00 TO NODE 414.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.63
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.541 C2-13
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 1.50 0.25 0.100 69
COMMERCIAL D 0.10 0.20 0.100 75
RESIDENTIAL
".4 DWELLING/ACRE" C 2.80 0.25 0.900 69
RESIDENTIAL
".4 DWELLING/ACRE" D 1.00 0.20 0.900 75
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 0.20 0.25 0.500 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 0.10 0.20 0.500 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.654
SUBAREA AREA(ACRES) = 5.70 SUBAREA RUNOFF(CFS) = 17.37
EFFECTIVE AREA(ACRES) = 11.20 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.73
TOTAL AREA(ACRES) = 11.2 PEAK FLOW RATE(CFS) = 33.97

\*\*\*\*\*
FLOW PROCESS FROM NODE 414.00 TO NODE 414.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.63
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.541 C2-13
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS C 0.10 0.25 0.200 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.31
EFFECTIVE AREA(ACRES) = 11.30 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 11.3 PEAK FLOW RATE(CFS) = 34.29

\*\*\*\*\*
FLOW PROCESS FROM NODE 414.00 TO NODE 415.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 470.00 DOWNSTREAM(FEET) = 445.00
FLOW LENGTH(FEET) = 528.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.24
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.29
PIPE TRAVEL TIME(MIN.) = 0.54 Tc(MIN.) = 9.17
LONGEST FLOWPATH FROM NODE 410.00 TO NODE 415.00 = 1953.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 415.00 TO NODE 415.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.17
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.421 C2-14
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL C 0.90 0.25 0.100 69
COMMERCIAL D 0.60 0.20 0.100 75
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 6.30 0.25 0.500 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 3.70 0.20 0.500 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.448
SUBAREA AREA(ACRES) = 11.50 SUBAREA RUNOFF(CFS) = 34.34
EFFECTIVE AREA(ACRES) = 22.80 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 22.8 PEAK FLOW RATE(CFS) = 67.40

\*\*\*\*\*
FLOW PROCESS FROM NODE 415.00 TO NODE 416.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 445.00 DOWNSTREAM(FEET) = 415.00
FLOW LENGTH(FEET) = 650.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.95
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 67.40
PIPE TRAVEL TIME(MIN.) = 0.57 Tc(MIN.) = 9.75
LONGEST FLOWPATH FROM NODE 410.00 TO NODE 416.00 = 2603.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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=====
MAINLINE Tc(MIN.) = 9.75
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.306 C2-15
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS C 1.60 0.25 0.200 69
APARTMENTS D 10.90 0.20 0.200 75
COMMERCIAL C 1.30 0.25 0.100 69
COMMERCIAL D 1.30 0.20 0.100 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 1.10 0.25 0.200 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 7.00 0.20 0.200 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.189
SUBAREA AREA(ACRES) = 23.20 SUBAREA RUNOFF(CFS) = 68.21
EFFECTIVE AREA(ACRES) = 46.00 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 46.0 PEAK FLOW RATE(CFS) = 133.26

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*****
FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 9.75
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.306 C2-15
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE" D 0.40 0.20 0.600 75
RESIDENTIAL
"5-7 DWELLINGS/ACRE" C 4.90 0.25 0.500 69
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 9.30 0.20 0.500 75
RESIDENTIAL
"8-10 DWELLINGS/ACRE" C 0.30 0.25 0.400 69
RESIDENTIAL
"8-10 DWELLINGS/ACRE" D 0.10 0.20 0.400 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 15.00 SUBAREA RUNOFF(CFS) = 43.17
EFFECTIVE AREA(ACRES) = 61.00 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 61.0 PEAK FLOW RATE(CFS) = 176.42

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*****
FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====

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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.75
RAINFALL INTENSITY(INCH/HR) = 3.31
AREA-AVERAGED Fm(INCH/HR) = 0.09

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```

AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.41
EFFECTIVE STREAM AREA(ACRES) = 61.00
TOTAL STREAM AREA(ACRES) = 61.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 176.42

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*****
FLOW PROCESS FROM NODE 420.00 TO NODE 421.00 IS CODE = 21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

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```

INITIAL SUBAREA FLOW-LENGTH(FEET) = 328.00
ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 495.00

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```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.368 C2-20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.207
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
".4 DWELLING/ACRE" D 0.70 0.20 0.900 75 7.53
RESIDENTIAL
"3-4 DWELLINGS/ACRE" D 0.20 0.20 0.600 75 6.37
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.833
SUBAREA RUNOFF(CFS) = 3.27
TOTAL AREA(ACRES) = 0.90 PEAK FLOW RATE(CFS) = 3.27

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*****
FLOW PROCESS FROM NODE 421.00 TO NODE 422.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

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ELEVATION DATA: UPSTREAM(FEET) = 495.00 DOWNSTREAM(FEET) = 487.00
FLOW LENGTH(FEET) = 308.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.13
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.27
PIPE TRAVEL TIME(MIN.) = 0.72 Tc(MIN.) = 7.09
LONGEST FLOWPATH FROM NODE 420.00 TO NODE 422.00 = 636.00 FEET.

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FLOW PROCESS FROM NODE 422.00 TO NODE 422.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 7.09
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.959 C2-21
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
".4 DWELLING/ACRE" D 1.30 0.20 0.900 75

```

RESIDENTIAL  
 "3-4 DWELLINGS/ACRE" D 0.50 0.20 0.600 75  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.817  
 SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 6.15  
 EFFECTIVE AREA(ACRES) = 2.70 AREA-AVERAGED Fm(INCH/HR) = 0.16  
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.82  
 TOTAL AREA (ACRES) = 2.7 PEAK FLOW RATE(CFS) = 9.22

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 422.00 TO NODE 423.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 487.00 DOWNSTREAM(FEET) = 478.00  
 FLOW LENGTH(FEET) = 373.00 MANNING'S N = 0.013  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000  
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.0 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.14  
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 9.22  
 PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 7.77  
 LONGEST FLOWPATH FROM NODE 420.00 TO NODE 423.00 = 1009.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 423.00 TO NODE 423.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 7.77 **C2-22**  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.759  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.80	0.30	0.900	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	C	1.20	0.25	0.900	69
RESIDENTIAL					
" .4 DWELLING/ACRE"	D	0.20	0.20	0.900	75
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.40	0.30	0.600	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	1.70	0.25	0.600	69
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	D	0.10	0.20	0.600	75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.26					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.750					
SUBAREA AREA(ACRES) = 4.40 SUBAREA RUNOFF(CFS) = 14.11					
EFFECTIVE AREA(ACRES) = 7.10 AREA-AVERAGED Fm(INCH/HR) = 0.18					
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.78					
TOTAL AREA(ACRES) = 7.1 PEAK FLOW RATE(CFS) = 22.85					

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 423.00 TO NODE 424.00 IS CODE = 31  
 -----

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 478.00 DOWNSTREAM(FEET) = 454.00  
 FLOW LENGTH(FEET) = 995.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.06  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 22.85  
 PIPE TRAVEL TIME(MIN.) = 1.50 Tc(MIN.) = 9.27  
 LONGEST FLOWPATH FROM NODE 420.00 TO NODE 424.00 = 2004.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 424.00 TO NODE 424.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.27 **C2-23**  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.402  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	C	0.80	0.25	0.200	69
APARTMENTS	D	0.40	0.20	0.200	75
PUBLIC PARK	B	0.90	0.30	0.850	56
PUBLIC PARK	C	0.40	0.25	0.850	69
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	C	0.70	0.25	0.900	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.626					
SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 9.60					
EFFECTIVE AREA(ACRES) = 10.40 AREA-AVERAGED Fm(INCH/HR) = 0.18					
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.73					
TOTAL AREA(ACRES) = 10.4 PEAK FLOW RATE(CFS) = 30.17					

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 424.00 TO NODE 424.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.27 **C2-23**  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.402  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.30	0.30	0.600	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	C	2.10	0.25	0.600	69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600					
SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 15.71					
EFFECTIVE AREA(ACRES) = 15.80 AREA-AVERAGED Fm(INCH/HR) = 0.18					
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.69					
TOTAL AREA(ACRES) = 15.8 PEAK FLOW RATE(CFS) = 45.88					

\*\*\*\*\*

FLOW PROCESS FROM NODE 424.00 TO NODE 416.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 454.00 DOWNSTREAM(FEET) = 415.00
FLOW LENGTH(FEET) = 1555.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.34
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 45.88
PIPE TRAVEL TIME(MIN.) = 1.94 Tc(MIN.) = 11.21
LONGEST FLOWPATH FROM NODE 420.00 TO NODE 416.00 = 3559.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 11.21
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.054
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS C 3.70 0.25 0.200 69
APARTMENTS D 6.80 0.20 0.200 75
RESIDENTIAL
"11+ DWELLINGS/ACRE" C 0.70 0.25 0.200 69
RESIDENTIAL
"11+ DWELLINGS/ACRE" D 2.60 0.20 0.200 75
RESIDENTIAL
"3-4 DWELLINGS/ACRE" C 2.20 0.25 0.600 69
RESIDENTIAL
"3-4 DWELLINGS/ACRE" D 9.90 0.20 0.600 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.387
SUBAREA AREA(ACRES) = 25.90 SUBAREA RUNOFF(CFS) = 69.29
EFFECTIVE AREA(ACRES) = 41.70 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 41.7 PEAK FLOW RATE(CFS) = 110.23

C2-24

\*\*\*\*\*
FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 11.21
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.054
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE" D 1.30 0.20 0.500 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA(ACRES) = 1.30 SUBAREA RUNOFF(CFS) = 3.46
EFFECTIVE AREA(ACRES) = 43.00 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.50

C2-24

TOTAL AREA(ACRES) = 43.0 PEAK FLOW RATE(CFS) = 113.69

\*\*\*\*\*
FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 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.) = 11.21
RAINFALL INTENSITY(INCH/HR) = 3.05
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.23
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 43.00
TOTAL STREAM AREA(ACRES) = 43.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 113.69

\*\* CONFLUENCE DATA \*\*
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 176.42 9.75 3.306 0.22( 0.09) 0.41 61.0 410.00
2 113.69 11.21 3.054 0.23( 0.12) 0.50 43.0 420.00

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

\*\* PEAK FLOW RATE TABLE \*\*
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 283.74 9.75 3.306 0.23( 0.10) 0.45 98.4 410.00
2 276.29 11.21 3.054 0.23( 0.10) 0.45 104.0 420.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 283.74 Tc(MIN.) = 9.75
EFFECTIVE AREA(ACRES) = 98.38 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 104.0
LONGEST FLOWPATH FROM NODE 420.00 TO NODE 416.00 = 3559.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 416.00 TO NODE 417.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 415.00 DOWNSTREAM(FEET) = 395.00
FLOW LENGTH(FEET) = 1084.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 45.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.82
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 283.74
PIPE TRAVEL TIME(MIN.) = 0.96 Tc(MIN.) = 10.71
LONGEST FLOWPATH FROM NODE 420.00 TO NODE 417.00 = 4643.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 10.71  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.135 **C2-25**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	1.70	0.25	0.100	69
COMMERCIAL	D	2.90	0.20	0.100	75
PUBLIC PARK	D	3.60	0.20	0.850	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	C	4.50	0.25	0.200	69
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	4.50	0.20	0.200	75
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.10	0.20	0.900	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313  
SUBAREA AREA(ACRES) = 17.30 SUBAREA RUNOFF(CFS) = 47.79  
EFFECTIVE AREA(ACRES) = 115.68 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.43  
TOTAL AREA(ACRES) = 121.3 PEAK FLOW RATE(CFS) = 316.37

\*\*\*\*\*  
FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 10.71  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.135 **C2-25**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	C	0.80	0.25	0.400	69
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	0.20	0.20	0.400	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400  
SUBAREA AREA(ACRES) = 1.00 SUBAREA RUNOFF(CFS) = 2.73  
EFFECTIVE AREA(ACRES) = 116.68 AREA-AVERAGED Fm(INCH/HR) = 0.10  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.43  
TOTAL AREA(ACRES) = 122.3 PEAK FLOW RATE(CFS) = 319.10

\*\*\*\*\*  
FLOW PROCESS FROM NODE 417.00 TO NODE 430.00 IS CODE = 31  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 395.00 DOWNSTREAM(FEET) = 372.00  
FLOW LENGTH(FEET) = 1572.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 63.0 INCH PIPE IS 48.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.87  
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 319.10  
PIPE TRAVEL TIME(MIN.) = 1.47 Tc(MIN.) = 12.17

LONGEST FLOWPATH FROM NODE 420.00 TO NODE 430.00 = 6215.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 430.00 TO NODE 430.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 12.17  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.915 **C2-8**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.70	0.30	0.100	56
COMMERCIAL	C	0.20	0.25	0.100	69
COMMERCIAL	D	0.40	0.20	0.100	75
PUBLIC PARK	B	5.70	0.30	0.850	56
PUBLIC PARK	C	4.50	0.25	0.850	69
PUBLIC PARK	D	9.40	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.803  
SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 51.20  
EFFECTIVE AREA(ACRES) = 137.58 AREA-AVERAGED Fm(INCH/HR) = 0.11  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.48  
TOTAL AREA(ACRES) = 143.2 PEAK FLOW RATE(CFS) = 347.24

\*\*\*\*\*  
FLOW PROCESS FROM NODE 430.00 TO NODE 430.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 12.17  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.915 **C2-26**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	A	0.70	0.40	0.850	32
PUBLIC PARK	B	8.90	0.30	0.850	56
PUBLIC PARK	C	1.20	0.25	0.850	69
PUBLIC PARK	D	3.70	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850  
SUBAREA AREA(ACRES) = 14.50 SUBAREA RUNOFF(CFS) = 34.99  
EFFECTIVE AREA(ACRES) = 152.08 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.52  
TOTAL AREA(ACRES) = 157.7 PEAK FLOW RATE(CFS) = 382.23

\*\*\*\*\*  
FLOW PROCESS FROM NODE 430.00 TO NODE 430.00 IS CODE = 11  
-----

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

=====

\*\* MAIN STREAM CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	382.23	12.17	2.915	0.24( 0.12)	0.52	152.1	410.00
2	370.52	13.64	2.733	0.24( 0.12)	0.52	157.7	420.00

LONGEST FLOWPATH FROM NODE 420.00 TO NODE 430.00 = 6215.00 FEET.

\*\* MEMORY BANK # 2 CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	530.64	17.96	2.339	0.24( 0.11)	0.45	260.7	400.00
2	494.25	20.44	2.174	0.24( 0.11)	0.45	262.6	430.00

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 430.00 = 9709.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	834.64	12.17	2.915	0.24( 0.11)	0.48	328.7	410.00
2	844.68	13.64	2.733	0.24( 0.11)	0.48	355.7	420.00
3	845.23	17.96	2.339	0.24( 0.11)	0.48	418.4	400.00
4	785.44	20.44	2.174	0.24( 0.11)	0.48	420.3	430.00

TOTAL AREA (ACRES) = 420.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 845.23 Tc (MIN.) = 17.962  
EFFECTIVE AREA (ACRES) = 418.38 AREA-AVERAGED Fm (INCH/HR) = 0.11  
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.48  
TOTAL AREA (ACRES) = 420.3  
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 430.00 = 9709.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 430.00 TO NODE 431.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 372.00 DOWNSTREAM (FEET) = 300.00

FLOW LENGTH (FEET) = 1358.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 72.0 INCH PIPE IS 54.1 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 37.09

ESTIMATED PIPE DIAMETER (INCH) = 72.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 845.23

PIPE TRAVEL TIME (MIN.) = 0.61 Tc (MIN.) = 18.57

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 431.00 = 11067.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 431.00 TO NODE 431.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 18.57

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.295

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	A	7.40	0.40	0.200	32
APARTMENTS	B	15.00	0.30	0.200	56
APARTMENTS	C	5.80	0.25	0.200	69
APARTMENTS	D	2.50	0.20	0.200	75
COMMERCIAL	A	9.10	0.40	0.100	32
COMMERCIAL	B	1.50	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.32

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.174

SUBAREA AREA (ACRES) = 41.30 SUBAREA RUNOFF (CFS) = 83.25

EFFECTIVE AREA (ACRES) = 459.68 AREA-AVERAGED Fm (INCH/HR) = 0.11  
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.45  
TOTAL AREA (ACRES) = 461.6 PEAK FLOW RATE (CFS) = 905.13

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	908.55	12.78	2.836	0.24( 0.11)	0.45	370.0	410.00
2	914.19	14.25	2.666	0.24( 0.11)	0.45	397.0	420.00
3	905.13	18.57	2.295	0.24( 0.11)	0.45	459.7	400.00
4	843.14	21.06	2.137	0.24( 0.11)	0.45	461.6	430.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE (CFS) = 914.19 Tc (MIN.) = 14.25

AREA-AVERAGED Fm (INCH/HR) = 0.11 AREA-AVERAGED Fp (INCH/HR) = 0.24

AREA-AVERAGED Ap = 0.45 EFFECTIVE AREA (ACRES) = 396.98

\*\*\*\*\*

FLOW PROCESS FROM NODE 431.00 TO NODE 431.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 14.25

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.666

C2-27

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.50	0.25	0.100	69
COMMERCIAL	D	0.40	0.20	0.100	75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.23

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA (ACRES) = 0.90 SUBAREA RUNOFF (CFS) = 2.14

EFFECTIVE AREA (ACRES) = 397.88 AREA-AVERAGED Fm (INCH/HR) = 0.11

AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.45

TOTAL AREA (ACRES) = 462.5 PEAK FLOW RATE (CFS) = 916.34

\*\*\*\*\*

FLOW PROCESS FROM NODE 431.00 TO NODE 331.00 IS CODE = 11

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

\*\* MAIN STREAM CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	910.83	12.78	2.836	0.24( 0.11)	0.45	370.9	410.00
2	916.34	14.25	2.666	0.24( 0.11)	0.45	397.9	420.00
3	906.97	18.57	2.295	0.24( 0.11)	0.45	460.6	400.00
4	844.85	21.06	2.137	0.24( 0.11)	0.45	462.5	430.00

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 331.00 = 11067.00 FEET.

\*\* MEMORY BANK # 1 CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1414.03	18.15	2.326	0.23( 0.09)	0.40	703.7	310.00
2	1447.83	21.75	2.099	0.23( 0.09)	0.40	802.3	300.00
3	1448.20	21.86	2.093	0.23( 0.09)	0.40	805.0	320.00
4	1294.20	27.69	1.831	0.23( 0.10)	0.42	829.8	390.00

LONGEST FLOWPATH FROM NODE 390.00 TO NODE 331.00 = 13248.00 FEET.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2134.53	12.78	2.836	0.24( 0.10)	0.42	866.7	410.00
2	2196.43	14.25	2.666	0.24( 0.10)	0.42	950.6	420.00
3	2321.93	18.15	2.326	0.24( 0.10)	0.42	1158.1	310.00
4	2325.00	18.57	2.295	0.24( 0.10)	0.42	1176.0	400.00
5	2286.24	21.06	2.137	0.24( 0.10)	0.42	1246.1	430.00
6	2276.67	21.75	2.099	0.24( 0.10)	0.42	1264.8	300.00
7	2274.47	21.86	2.093	0.24( 0.10)	0.42	1267.5	320.00
8	2011.41	27.69	1.831	0.24( 0.10)	0.43	1292.3	390.00
TOTAL AREA (ACRES) =		1292.3					

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 2325.00 Tc(MIN.) = 18.572  
 EFFECTIVE AREA(ACRES) = 1175.98 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA(ACRES) = 1292.3  
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 331.00 = 13248.00 FEET.

=====  
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1292.3 TC(MIN.) = 18.57  
 EFFECTIVE AREA(ACRES) = 1175.98 AREA-AVERAGED Fm(INCH/HR) = 0.10  
 AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.419  
 PEAK FLOW RATE(CFS) = 2325.00

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2134.53	12.78	2.836	0.24( 0.10)	0.42	866.7	410.00
2	2196.43	14.25	2.666	0.24( 0.10)	0.42	950.6	420.00
3	2321.93	18.15	2.326	0.24( 0.10)	0.42	1158.1	310.00
4	2325.00	18.57	2.295	0.24( 0.10)	0.42	1176.0	400.00
5	2286.24	21.06	2.137	0.24( 0.10)	0.42	1246.1	430.00
6	2276.67	21.75	2.099	0.24( 0.10)	0.42	1264.8	300.00
7	2274.47	21.86	2.093	0.24( 0.10)	0.42	1267.5	320.00
8	2011.41	27.69	1.831	0.24( 0.10)	0.43	1292.3	390.00

=====  
 END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* RMV PA-3 BODR 2022 - SUBWATERSHED O \*  
\* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
\* 100-YR HC APRIL 2022 CPHAN \*  
\*\*\*\*\*

FILE NAME: PA3000HC.DAT  
TIME/DATE OF STUDY: 17:02 04/29/2022

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*DATA BANK RAINFALL USED\*  
\*ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD\*

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

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET- / IN- / SIDE	CROSSFALL (FT)	STREET- / OUT- / SIDE	CURB HEIGHT (FT)	GUTTER- / /	GEOMETRIES: /	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150	
2	32.0	27.0	0.020/0.020/ ---	0.67	2.00	0.0312	0.167	0.0150	
3	13.0	8.0	0.020/0.020/ ---	0.33	1.00	0.0312	0.125	0.0150	

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 600.00 TO NODE 601.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 322.00  
ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 635.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.951  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.171  
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "OPEN BRUSH"	C	0.80	0.25	1.000	92	9.95

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA RUNOFF(CFS) = 2.82  
TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 2.82

O-1

\*\*\*\*\*  
FLOW PROCESS FROM NODE 601.00 TO NODE 602.00 IS CODE = 51  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 635.00 DOWNSTREAM(FEET) = 585.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 352.00 CHANNEL SLOPE = 0.1420  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.963

O-2

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	C	2.90	0.25	1.000	92

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.67  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.32  
AVERAGE FLOW DEPTH(FEET) = 0.64 TRAVEL TIME(MIN.) = 0.93  
Tc(MIN.) = 10.88  
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 9.69  
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 12.36

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.76 FLOW VELOCITY(FEET/SEC.) = 7.13  
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 602.00 = 674.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 602.00 TO NODE 603.00 IS CODE = 51  
-----

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

ELEVATION DATA: UPSTREAM(FEET) = 585.00 DOWNSTREAM(FEET) = 515.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 872.00 CHANNEL SLOPE = 0.0803  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.605

O-3

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	C	3.7	0.25	1.000	92

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
NATURAL FAIR COVER					
"OPEN BRUSH"	C	14.80	0.25	1.000	92
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.20	0.25	0.900	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 35.05  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.43  
AVERAGE FLOW DEPTH (FEET) = 1.25 TRAVEL TIME (MIN.) = 1.96  
Tc (MIN.) = 12.84  
SUBAREA AREA (ACRES) = 15.00 SUBAREA RUNOFF (CFS) = 45.29  
EFFECTIVE AREA (ACRES) = 18.70 AREA-AVERAGED Fm (INCH/HR) = 0.25  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
TOTAL AREA (ACRES) = 18.7 PEAK FLOW RATE (CFS) = 56.46

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH (FEET) = 1.50 FLOW VELOCITY (FEET/SEC.) = 8.38  
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 603.00 = 1546.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 603.00 TO NODE 604.00 IS CODE = 51  
-----

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

\*\*\*\*\*  
ELEVATION DATA: UPSTREAM (FEET) = 515.00 DOWNSTREAM (FEET) = 455.00  
CHANNEL LENGTH THRU SUBAREA (FEET) = 733.00 CHANNEL SLOPE = 0.0819  
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.405  
SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	C	0.10	0.25	1.000	91
NATURAL FAIR COVER					
"OPEN BRUSH"	C	11.70	0.25	1.000	92
RESIDENTIAL					
".4 DWELLING/ACRE"	C	1.90	0.25	0.900	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.986  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 75.94  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 9.10  
AVERAGE FLOW DEPTH (FEET) = 1.67 TRAVEL TIME (MIN.) = 1.34  
Tc (MIN.) = 14.18  
SUBAREA AREA (ACRES) = 13.70 SUBAREA RUNOFF (CFS) = 38.94  
EFFECTIVE AREA (ACRES) = 32.40 AREA-AVERAGED Fm (INCH/HR) = 0.25  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.99  
TOTAL AREA (ACRES) = 32.4 PEAK FLOW RATE (CFS) = 92.05

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH (FEET) = 1.80 FLOW VELOCITY (FEET/SEC.) = 9.51  
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 604.00 = 2279.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 604.00 TO NODE 605.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM (FEET) = 455.00 DOWNSTREAM (FEET) = 325.00  
FLOW LENGTH (FEET) = 2571.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.7 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 21.18  
ESTIMATED PIPE DIAMETER (INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 92.05  
PIPE TRAVEL TIME (MIN.) = 2.02 Tc (MIN.) = 16.20  
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 605.00 = 4850.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc (MIN.) = 16.20  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.154  
SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"WOODLAND, GRASS"	A	0.10	0.40	1.000	64
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	84
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.30	0.30	0.900	76
NATURAL FAIR COVER					
"WOODLAND, GRASS"	B	0.60	0.30	1.000	83
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	C	1.00	0.25	1.000	91
NATURAL FAIR COVER					
"OPEN BRUSH"	C	8.20	0.25	1.000	92

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.26  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.982  
SUBAREA AREA (ACRES) = 12.50 SUBAREA RUNOFF (CFS) = 32.58  
EFFECTIVE AREA (ACRES) = 44.90 AREA-AVERAGED Fm (INCH/HR) = 0.25  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.99  
TOTAL AREA (ACRES) = 44.9 PEAK FLOW RATE (CFS) = 117.32

\*\*\*\*\*  
FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
-----  
MAINLINE Tc (MIN.) = 16.20  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.154  
SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	C	6.20	0.25	0.900	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900  
SUBAREA AREA (ACRES) = 6.20 SUBAREA RUNOFF (CFS) = 16.35  
EFFECTIVE AREA (ACRES) = 51.10 AREA-AVERAGED Fm (INCH/HR) = 0.25  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.98

TOTAL AREA (ACRES) = 51.1 PEAK FLOW RATE (CFS) = 133.66

=====  
END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 51.1 TC (MIN.) = 16.20  
EFFECTIVE AREA (ACRES) = 51.10 AREA-AVERAGED Fm (INCH/HR) = 0.25  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.979  
PEAK FLOW RATE (CFS) = 133.66  
=====

=====  
END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
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Analysis prepared by:

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* RMV PA-3 SUBWATERSHED 0 BODR 2022 \*  
\* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
\* 25-YR HC SEPT 2022 ROKAMOTO \*  
\*\*\*\*\*

FILE NAME: PA3025HC.DAT  
TIME/DATE OF STUDY: 11:48 09/16/2022

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*DATA BANK RAINFALL USED\*  
\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET- / OUT-/PARK- SIDE / SIDE/ WAY	STREET-CROSSFALL: HEIGHT (FT)	CURB GUTTER-GEOMETRIES: WIDTH (FT)	LIP HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167 0.0150
2	32.0	27.0	0.020/0.020/ ---	0.67	2.00	0.0312	0.167 0.0150
3	13.0	8.0	0.020/0.020/ ---	0.33	1.00	0.0312	0.125 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 600.00 TO NODE 601.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 322.00  
ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 635.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.951  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.267  
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "OPEN BRUSH"	C	0.80	0.25	1.000	77	9.95

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA RUNOFF(CFS) = 2.17  
TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 2.17

O-1

\*\*\*\*\*  
FLOW PROCESS FROM NODE 601.00 TO NODE 602.00 IS CODE = 51  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 635.00 DOWNSTREAM(FEET) = 585.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 352.00 CHANNEL SLOPE = 0.1420  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.096

O-2

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	C	2.90	0.25	1.000	77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.89  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.90  
AVERAGE FLOW DEPTH(FEET) = 0.58 TRAVEL TIME(MIN.) = 0.99  
Tc(MIN.) = 10.95  
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 7.43  
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 9.48

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.69 FLOW VELOCITY(FEET/SEC.) = 6.64  
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 602.00 = 674.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 602.00 TO NODE 603.00 IS CODE = 51  
-----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 585.00 DOWNSTREAM(FEET) = 515.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 872.00 CHANNEL SLOPE = 0.0803  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.804

O-3

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL	AREA	Fp	Ap	SCS
NATURAL FAIR COVER "OPEN BRUSH"	C	2.90	0.25	1.000

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
NATURAL FAIR COVER					
"OPEN BRUSH"	C	14.80	0.25	1.000	77
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.20	0.25	0.900	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.75  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.96  
AVERAGE FLOW DEPTH(FEET) = 1.13 TRAVEL TIME(MIN.) = 2.09  
Tc(MIN.) = 13.04  
SUBAREA AREA(ACRES) = 15.00 SUBAREA RUNOFF(CFS) = 34.49  
EFFECTIVE AREA(ACRES) = 18.70 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 18.7 PEAK FLOW RATE(CFS) = 43.00

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 1.35 FLOW VELOCITY(FEET/SEC.) = 7.83  
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 603.00 = 1546.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 603.00 TO NODE 604.00 IS CODE = 51  
-----

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

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	0.10	0.25	1.000	75
NATURAL FAIR COVER					
"OPEN BRUSH"	C	11.70	0.25	1.000	77
RESIDENTIAL					
".4 DWELLING/ACRE"	C	1.90	0.25	0.900	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.986  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 57.77  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.49  
AVERAGE FLOW DEPTH(FEET) = 1.51 TRAVEL TIME(MIN.) = 1.44  
Tc(MIN.) = 14.47  
SUBAREA AREA(ACRES) = 13.70 SUBAREA RUNOFF(CFS) = 29.55  
EFFECTIVE AREA(ACRES) = 32.40 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.99  
TOTAL AREA(ACRES) = 32.4 PEAK FLOW RATE(CFS) = 69.83

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 1.61 FLOW VELOCITY(FEET/SEC.) = 8.93  
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 604.00 = 2279.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 604.00 TO NODE 605.00 IS CODE = 31  
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 455.00 DOWNSTREAM(FEET) = 325.00  
FLOW LENGTH(FEET) = 2571.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.3 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.79  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 69.83  
PIPE TRAVEL TIME(MIN.) = 2.16 Tc(MIN.) = 16.64  
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 605.00 = 4850.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.64 O-5  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"WOODLAND,GRASS"	A	0.10	0.40	1.000	44
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.30	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.60	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	1.00	0.25	1.000	75
NATURAL FAIR COVER					
"OPEN BRUSH"	C	8.20	0.25	1.000	77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.26  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.982  
SUBAREA AREA(ACRES) = 12.50 SUBAREA RUNOFF(CFS) = 24.57  
EFFECTIVE AREA(ACRES) = 44.90 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.99  
TOTAL AREA(ACRES) = 44.9 PEAK FLOW RATE(CFS) = 88.55

\*\*\*\*\*  
FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81  
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.64 O-5  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	C	6.20	0.25	0.900	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900  
SUBAREA AREA(ACRES) = 6.20 SUBAREA RUNOFF(CFS) = 12.37  
EFFECTIVE AREA(ACRES) = 51.10 AREA-AVERAGED Fm(INCH/HR) = 0.25  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.98

TOTAL AREA (ACRES) = 51.1 PEAK FLOW RATE (CFS) = 100.93

=====  
END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 51.1 TC (MIN.) = 16.64  
EFFECTIVE AREA (ACRES) = 51.10 AREA-AVERAGED Fm (INCH/HR) = 0.25  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.979  
PEAK FLOW RATE (CFS) = 100.93  
=====

=====  
END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
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Ver. 20.0 Release Date: 06/01/2013 License ID 1264

Analysis prepared by:

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* RMV PA-4 SUBAREA E ROMP 2018 \*  
\* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
\* 100-YR HC MAY 2018 JMITAL \*  
\*\*\*\*\*

FILE NAME: PA4E00HC.DAT  
TIME/DATE OF STUDY: 16:03 05/31/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*DATA BANK RAINFALL USED\*  
\*ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD\*

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0312	0.167	0.0150
2	32.0	27.0	0.020/0.020/ ---	0.67	2.00 0.0312	0.167	0.0150
3	13.0	8.0	0.020/0.020/ ---	0.33	1.00 0.0312	0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 1.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  - (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 800.00 TO NODE 801.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00  
ELEVATION DATA: UPSTREAM(FEET) = 485.00 DOWNSTREAM(FEET) = 455.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.187

E-1

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
".4 DWELLING/ACRE"	C	0.20	0.25	0.900	86	8.00
COMMERCIAL	D	0.80	0.20	0.100	91	5.00
RESIDENTIAL						
".4 DWELLING/ACRE"	D	0.50	0.20	0.900	91	8.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473  
SUBAREA RUNOFF(CFS) = 8.22  
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 8.22

\*\*\*\*\*  
FLOW PROCESS FROM NODE 801.00 TO NODE 801.10 IS CODE = 62  
-----

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

UPSTREAM ELEVATION(FEET) = 455.00 DOWNSTREAM ELEVATION(FEET) = 451.00  
STREET LENGTH(FEET) = 270.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.20  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.44  
HALFSTREET FLOOD WIDTH(FEET) = 15.27  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.34  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.45  
STREET FLOW TRAVEL TIME(MIN.) = 1.35 Tc(MIN.) = 6.35  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.396

E-2

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.10	0.25	0.100	86
COMMERCIAL	D	2.10	0.20	0.100	91
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.70	0.20	0.900	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.293  
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 13.93  
EFFECTIVE AREA(ACRES) = 4.40 AREA-AVERAGED Fm(INCH/HR) = 0.07  
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 4.4 PEAK FLOW RATE(CFS) = 21.08

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.54
FLOW VELOCITY(FEET/SEC.) = 3.58 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.71
LONGEST FLOWPATH FROM NODE 800.00 TO NODE 801.10 = 600.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 801.10 TO NODE 802.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 451.00 DOWNSTREAM ELEVATION(FEET) = 445.00
STREET LENGTH(FEET) = 391.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.99

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.54
HALFSTREET FLOOD WIDTH(FEET) = 21.05
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.09
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 2.20
STREET FLOW TRAVEL TIME(MIN.) = 1.59 Tc(MIN.) = 7.94

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.747 E-2.1

SUBAREA LOSS RATE DATA(AMC III):

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include Commercial, Residential, and Commercial with various land use types.

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.58 HALFSTREET FLOOD WIDTH(FEET) = 23.40
FLOW VELOCITY(FEET/SEC.) = 4.36 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.53
LONGEST FLOWPATH FROM NODE 800.00 TO NODE 802.00 = 991.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 802.00 TO NODE 808.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 445.00 DOWNSTREAM(FEET) = 398.00
FLOW LENGTH(FEET) = 843.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.18
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 44.30
PIPE TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 8.71
LONGEST FLOWPATH FROM NODE 800.00 TO NODE 808.00 = 1834.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.71
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.501 E-3

SUBAREA LOSS RATE DATA(AMC III):

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include Residential, Commercial, and Commercial with various land use types.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.26

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.329
SUBAREA AREA(ACRES) = 29.40 SUBAREA RUNOFF(CFS) = 116.84
EFFECTIVE AREA(ACRES) = 39.90 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 39.9 PEAK FLOW RATE(CFS) = 158.82

\*\*\*\*\*

FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.71
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.501 E-4

SUBAREA LOSS RATE DATA(AMC III):

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include Residential, Residential, Commercial, and Commercial with various land use types.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.34

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 63.06

EFFECTIVE AREA (ACRES) = 55.70 AREA-AVERAGED Fm (INCH/HR) = 0.07  
 AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.28  
 TOTAL AREA (ACRES) = 55.7 PEAK FLOW RATE (CFS) = 221.88

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION (MIN.) = 8.71  
 RAINFALL INTENSITY (INCH/HR) = 4.50  
 AREA-AVERAGED Fm (INCH/HR) = 0.07  
 AREA-AVERAGED Fp (INCH/HR) = 0.27  
 AREA-AVERAGED Ap = 0.28  
 EFFECTIVE STREAM AREA (ACRES) = 55.70  
 TOTAL STREAM AREA (ACRES) = 55.70  
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 221.88

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 810.00 TO NODE 811.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH (FEET) = 307.00  
 ELEVATION DATA: UPSTREAM (FEET) = 785.00 DOWNSTREAM (FEET) = 705.00

Tc = K \* [(LENGTH\*\* 3.00) / (ELEVATION CHANGE)] \*\* 0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.130  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.382

OE-1

SUBAREA Tc AND LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER						
"CHAPARRAL, BROADLEAF"	D	0.10	0.20	1.000	95	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	D	0.10	0.20	1.000	96	9.13
NATURAL FAIR COVER						
"CHAPARRAL, BROADLEAF"	C	0.20	0.25	1.000	91	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	C	0.50	0.25	1.000	92	9.13
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000						
SUBAREA RUNOFF (CFS) = 3.36						
TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 3.36						

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 811.00 TO NODE 812.00 IS CODE = 51

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 705.00 DOWNSTREAM (FEET) = 525.00  
 CHANNEL LENGTH THRU SUBAREA (FEET) = 695.00 CHANNEL SLOPE = 0.2590  
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00

\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.085

OE-2

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	D	2.10	0.20	1.000	96
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	C	3.10	0.25	1.000	91
NATURAL FAIR COVER					
"OPEN BRUSH"	C	3.20	0.25	1.000	92
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 17.92					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 9.74					
AVERAGE FLOW DEPTH (FEET) = 0.78 TRAVEL TIME (MIN.) = 1.19					
Tc (MIN.) = 10.32					
SUBAREA AREA (ACRES) = 8.40 SUBAREA RUNOFF (CFS) = 29.09					
EFFECTIVE AREA (ACRES) = 9.30 AREA-AVERAGED Fm (INCH/HR) = 0.24					
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 1.00					
TOTAL AREA (ACRES) = 9.3 PEAK FLOW RATE (CFS) = 32.20					

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH (FEET) = 0.97 FLOW VELOCITY (FEET/SEC.) = 11.32  
 LONGEST FLOWPATH FROM NODE 810.00 TO NODE 812.00 = 1002.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 812.00 TO NODE 813.00 IS CODE = 51

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 525.00 DOWNSTREAM (FEET) = 460.00  
 CHANNEL LENGTH THRU SUBAREA (FEET) = 1010.00 CHANNEL SLOPE = 0.0644  
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.658

OE-3

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	0.10	0.30	1.000	81
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	84
NATURAL FAIR COVER					
"WOODLAND, GRASS"	B	0.70	0.30	1.000	83
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	D	1.20	0.20	1.000	95
NATURAL FAIR COVER					
"OPEN BRUSH"	C	5.80	0.25	1.000	92
NATURAL FAIR COVER					
"OPEN BRUSH"	D	6.30	0.20	1.000	96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.23					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 54.45					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.67					
AVERAGE FLOW DEPTH (FEET) = 1.54 TRAVEL TIME (MIN.) = 2.19					
Tc (MIN.) = 12.51					
SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 44.45					

EFFECTIVE AREA(ACRES) = 23.70 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 23.7 PEAK FLOW RATE(CFS) = 73.08

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 1.72 FLOW VELOCITY(FEET/SEC.) = 8.24  
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 813.00 = 2012.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 813.00 TO NODE 813.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 12.51  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.658 **OE-3**  
SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
NATURAL FAIR COVER  
"CHAPARRAL,BROADLEAF" C 10.40 0.25 1.000 91  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 31.90  
EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 34.1 PEAK FLOW RATE(CFS) = 104.98

\*\*\*\*\*  
FLOW PROCESS FROM NODE 813.00 TO NODE 808.00 IS CODE = 31

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

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 460.00 DOWNSTREAM(FEET) = 398.00  
FLOW LENGTH(FEET) = 1046.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.6 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.12  
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 104.98  
PIPE TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 13.27  
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 808.00 = 3058.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 1

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

-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
TIME OF CONCENTRATION(MIN.) = 13.27  
RAINFALL INTENSITY(INCH/HR) = 3.54  
AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.24  
AREA-AVERAGED Ap = 1.00  
EFFECTIVE STREAM AREA(ACRES) = 34.10  
TOTAL STREAM AREA(ACRES) = 34.10  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 104.98

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	221.88	8.71	4.501	0.27( 0.07)	0.28	55.7	800.00
2	104.98	13.27	3.537	0.24( 0.24)	1.00	34.1	810.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	310.96	8.71	4.501	0.25( 0.12)	0.49	78.1	800.00
2	278.56	13.27	3.537	0.25( 0.14)	0.55	89.8	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 310.96 Tc(MIN.) = 8.71  
EFFECTIVE AREA(ACRES) = 78.10 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 89.8  
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 808.00 = 3058.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 808.00 TO NODE 809.00 IS CODE = 31

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

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 398.00 DOWNSTREAM(FEET) = 341.00  
FLOW LENGTH(FEET) = 756.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 32.51  
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 310.96  
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 9.10  
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 809.00 = 3814.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 9.10  
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.390 **E-5**  
SUBAREA LOSS RATE DATA(AMC III):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
APARTMENTS A 5.60 0.40 0.200 52  
APARTMENTS B 12.30 0.30 0.200 76  
COMMERCIAL A 0.50 0.40 0.100 52  
COMMERCIAL B 5.40 0.30 0.100 76  
RESIDENTIAL  
".4 DWELLING/ACRE" A 4.70 0.40 0.900 52  
RESIDENTIAL  
".4 DWELLING/ACRE" B 4.20 0.30 0.900 76  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.34  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.372

SUBAREA AREA (ACRES) = 32.70 SUBAREA RUNOFF (CFS) = 125.42  
 EFFECTIVE AREA (ACRES) = 110.80 AREA-AVERAGED Fm (INCH/HR) = 0.12  
 AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.45  
 TOTAL AREA (ACRES) = 122.5 PEAK FLOW RATE (CFS) = 425.44

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 9.10  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.390 **E-5**  
 SUBAREA LOSS RATE DATA (AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL A 9.90 0.40 0.100 52  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.40  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA AREA (ACRES) = 9.90 SUBAREA RUNOFF (CFS) = 38.76  
 EFFECTIVE AREA (ACRES) = 120.70 AREA-AVERAGED Fm (INCH/HR) = 0.12  
 AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.42  
 TOTAL AREA (ACRES) = 132.4 PEAK FLOW RATE (CFS) = 464.20

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 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.) = 9.10  
 RAINFALL INTENSITY (INCH/HR) = 4.39  
 AREA-AVERAGED Fm (INCH/HR) = 0.12  
 AREA-AVERAGED Fp (INCH/HR) = 0.27  
 AREA-AVERAGED Ap = 0.42  
 EFFECTIVE STREAM AREA (ACRES) = 120.70  
 TOTAL STREAM AREA (ACRES) = 132.40  
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 464.20

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 818.00 TO NODE 819.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH (FEET) = 323.00  
 ELEVATION DATA: UPSTREAM (FEET) = 625.00 DOWNSTREAM (FEET) = 517.00

Tc = K \* [(LENGTH\*\* 3.00) / (ELEVATION CHANGE)] \*\* 0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 8.864  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.457 **OE-4**  
 SUBAREA Tc AND LOSS RATE DATA (AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
 NATURAL FAIR COVER  
 "CHAPARRAL, BROADLEAF" D 0.10 0.20 1.000 95 8.86  
 NATURAL FAIR COVER  
 "OPEN BRUSH" C 0.30 0.25 1.000 92 8.86

NATURAL FAIR COVER  
 "CHAPARRAL, BROADLEAF" C 0.60 0.25 1.000 91 8.86  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA RUNOFF (CFS) = 3.79  
 TOTAL AREA (ACRES) = 1.00 PEAK FLOW RATE (CFS) = 3.79

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 819.00 TO NODE 820.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM (FEET) = 517.00 DOWNSTREAM (FEET) = 395.00  
 CHANNEL LENGTH THRU SUBAREA (FEET) = 1167.00 CHANNEL SLOPE = 0.1045  
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 20.00  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.810 **OE-5**  
 SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 COMMERCIAL C 0.10 0.25 0.100 86  
 RESIDENTIAL  
 ".4 DWELLING/ACRE" B 0.90 0.30 0.900 76  
 COMMERCIAL B 1.30 0.30 0.100 76  
 NATURAL FAIR COVER  
 "OPEN BRUSH" D 0.80 0.20 1.000 96  
 NATURAL FAIR COVER  
 "OPEN BRUSH" C 2.40 0.25 1.000 92  
 NATURAL FAIR COVER  
 "CHAPARRAL, BROADLEAF" D 3.20 0.20 1.000 95  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.845  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 18.00  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.97  
 AVERAGE FLOW DEPTH (FEET) = 0.93 TRAVEL TIME (MIN.) = 2.79  
 Tc (MIN.) = 11.66  
 SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 28.31  
 EFFECTIVE AREA (ACRES) = 9.70 AREA-AVERAGED Fm (INCH/HR) = 0.20  
 AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.86  
 TOTAL AREA (ACRES) = 9.7 PEAK FLOW RATE (CFS) = 31.52

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH (FEET) = 1.15 FLOW VELOCITY (FEET/SEC.) = 7.98  
 LONGEST FLOWPATH FROM NODE 818.00 TO NODE 820.00 = 1490.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 11.66  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.810 **OE-5**  
 SUBAREA LOSS RATE DATA (AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 NATURAL FAIR COVER  
 "CHAPARRAL, BROADLEAF" B 4.00 0.30 1.000 81

NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" C 7.10 0.25 1.000 91  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 35.38  
 EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.94  
 TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 66.90

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 11.66  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.810 **OE-6**

SUBAREA LOSS RATE DATA(AMC III):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	3.40	0.30	1.000	81
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	1.80	0.25	1.000	91
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	3.60	0.20	1.000	95
COMMERCIAL	B	1.00	0.30	0.100	76
NATURAL FAIR COVER					
"GRASS"	B	0.10	0.30	1.000	86
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.50	0.30	1.000	84

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.913  
 SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 33.50  
 EFFECTIVE AREA(ACRES) = 31.20 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.93  
 TOTAL AREA(ACRES) = 31.2 PEAK FLOW RATE(CFS) = 100.40

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 11.66  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.810 **OE-6**

SUBAREA LOSS RATE DATA(AMC III):  

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	C	4.60	0.25	1.000	92
NATURAL FAIR COVER					
"OPEN BRUSH"	D	2.60	0.20	1.000	96
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.997  
 SUBAREA AREA(ACRES) = 7.40 SUBAREA RUNOFF(CFS) = 23.82  
 EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.94

TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 124.22

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 820.00 TO NODE 817.00 IS CODE = 31  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 395.00 DOWNSTREAM(FEET) = 340.00  
 FLOW LENGTH(FEET) = 1232.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 21.48  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 124.22  
 PIPE TRAVEL TIME(MIN.) = 0.96 Tc(MIN.) = 12.61  
 LONGEST FLOWPATH FROM NODE 818.00 TO NODE 817.00 = 2722.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 817.00 TO NODE 817.00 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.) = 12.61  
 RAINFALL INTENSITY(INCH/HR) = 3.64  
 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.25  
 AREA-AVERAGED Ap = 0.94  
 EFFECTIVE STREAM AREA(ACRES) = 38.60  
 TOTAL STREAM AREA(ACRES) = 38.60  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 124.22

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	464.20	9.10	4.390	0.27( 0.12)	0.42	120.7	800.00
1	399.38	13.66	3.479	0.27( 0.13)	0.47	132.4	810.00
2	124.22	12.61	3.641	0.25( 0.23)	0.94	38.6	818.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	573.54	9.10	4.390	0.27( 0.14)	0.52	148.6	800.00
2	538.50	12.61	3.641	0.26( 0.15)	0.57	168.3	818.00
3	517.67	13.66	3.479	0.26( 0.15)	0.58	171.0	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 573.54 Tc(MIN.) = 9.10  
 EFFECTIVE AREA(ACRES) = 148.55 AREA-AVERAGED Fm(INCH/HR) = 0.14  
 AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 171.0  
 LONGEST FLOWPATH FROM NODE 810.00 TO NODE 817.00 = 3814.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 171.0 TC (MIN.) = 9.10  
EFFECTIVE AREA (ACRES) = 148.55 AREA-AVERAGED Fm (INCH/HR) = 0.14  
AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.521  
PEAK FLOW RATE (CFS) = 573.54

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	573.54	9.10	4.390	0.27( 0.14)	0.52	148.6	800.00
2	538.50	12.61	3.641	0.26( 0.15)	0.57	168.3	818.00
3	517.67	13.66	3.479	0.26( 0.15)	0.58	171.0	810.00

=====  
END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
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Ver. 20.0 Release Date: 06/01/2013 License ID 1264

Analysis prepared by:

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* RMV PA-4 SUBAREA E ROMP 2018 \*  
\* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
\* 25-YR HC MAY 2018 JMITAL \*  
\*\*\*\*\*

FILE NAME: PA4E25HC.DAT  
TIME/DATE OF STUDY: 09:56 06/03/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*DATA BANK RAINFALL USED\*  
\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313	0.167	0.0150
2	32.0	27.0	0.020/0.020/ ---	0.67	2.00 0.0312	0.167	0.0150
3	13.0	8.0	0.020/0.020/ ---	0.33	1.00 0.0312	0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)
- \*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*  
FLOW PROCESS FROM NODE 800.00 TO NODE 801.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00  
ELEVATION DATA: UPSTREAM(FEET) = 485.00 DOWNSTREAM(FEET) = 455.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.824

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SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
".4 DWELLING/ACRE"	C	0.20	0.25	0.900	69	8.00
COMMERCIAL	D	0.80	0.20	0.100	75	5.00
RESIDENTIAL						
".4 DWELLING/ACRE"	D	0.50	0.20	0.900	75	8.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473  
SUBAREA RUNOFF(CFS) = 6.38  
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 6.38

\*\*\*\*\*  
FLOW PROCESS FROM NODE 801.00 TO NODE 801.10 IS CODE = 62  
-----

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

=====

UPSTREAM ELEVATION(FEET) = 455.00 DOWNSTREAM ELEVATION(FEET) = 451.00  
STREET LENGTH(FEET) = 270.00 CURB HEIGHT(INCHES) = 8.0  
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.018  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.77

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.41  
HALFSTREET FLOOD WIDTH(FEET) = 13.71  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.14  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.28

STREET FLOW TRAVEL TIME(MIN.) = 1.43 Tc(MIN.) = 6.43  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.183

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SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	C	0.10	0.25	0.100	69
COMMERCIAL	D	2.10	0.20	0.100	75
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.70	0.20	0.900	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.293  
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 10.76  
EFFECTIVE AREA(ACRES) = 4.40 AREA-AVERAGED Fm(INCH/HR) = 0.07  
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.35  
TOTAL AREA(ACRES) = 4.4 PEAK FLOW RATE(CFS) = 16.27

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.74
FLOW VELOCITY(FEET/SEC.) = 3.38 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.50
LONGEST FLOWPATH FROM NODE 800.00 TO NODE 801.10 = 600.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 801.10 TO NODE 802.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 451.00 DOWNSTREAM ELEVATION(FEET) = 445.00
STREET LENGTH(FEET) = 391.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.21

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 19.02
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.83
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.92
STREET FLOW TRAVEL TIME(MIN.) = 1.70 Tc(MIN.) = 8.14

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.662

E-2.1

SUBAREA LOSS RATE DATA(AMC II):

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include Commercial, Residential, and Commercial with various land use types.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.205
SUBAREA AREA(ACRES) = 6.10 SUBAREA RUNOFF(CFS) = 19.84
EFFECTIVE AREA(ACRES) = 10.50 AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.27
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 34.05

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 21.05
FLOW VELOCITY(FEET/SEC.) = 4.10 DEPTH\*VELOCITY(FT\*FT/SEC.) = 2.21
LONGEST FLOWPATH FROM NODE 800.00 TO NODE 802.00 = 991.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 802.00 TO NODE 808.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 445.00 DOWNSTREAM(FEET) = 398.00
FLOW LENGTH(FEET) = 843.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.80
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.05
PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 8.97
LONGEST FLOWPATH FROM NODE 800.00 TO NODE 808.00 = 1834.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.97
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.465

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SUBAREA LOSS RATE DATA(AMC II):

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include Residential and Commercial with various land use types.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.329
SUBAREA AREA(ACRES) = 29.40 SUBAREA RUNOFF(CFS) = 89.43
EFFECTIVE AREA(ACRES) = 39.90 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 39.9 PEAK FLOW RATE(CFS) = 121.62

\*\*\*\*\*

FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.97
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.465

E-4

SUBAREA LOSS RATE DATA(AMC II):

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include Residential and Commercial with various land use types.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.34
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 48.33

EFFECTIVE AREA (ACRES) = 55.70 AREA-AVERAGED Fm (INCH/HR) = 0.07  
AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.28  
TOTAL AREA (ACRES) = 55.7 PEAK FLOW RATE (CFS) = 169.95

\*\*\*\*\*  
FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 1  
-----

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

=====

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION (MIN.) = 8.97  
RAINFALL INTENSITY (INCH/HR) = 3.46  
AREA-AVERAGED Fm (INCH/HR) = 0.07  
AREA-AVERAGED Fp (INCH/HR) = 0.27  
AREA-AVERAGED Ap = 0.28  
EFFECTIVE STREAM AREA (ACRES) = 55.70  
TOTAL STREAM AREA (ACRES) = 55.70  
PEAK FLOW RATE (CFS) AT CONFLUENCE = 169.95

\*\*\*\*\*  
FLOW PROCESS FROM NODE 810.00 TO NODE 811.00 IS CODE = 21  
-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH (FEET) = 307.00  
ELEVATION DATA: UPSTREAM (FEET) = 785.00 DOWNSTREAM (FEET) = 705.00

Tc = K \* [(LENGTH\*\* 3.00) / (ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.130  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.431

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SUBAREA Tc AND LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER						
"CHAPARRAL, BROADLEAF"	D	0.10	0.20	1.000	81	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	D	0.10	0.20	1.000	83	9.13
NATURAL FAIR COVER						
"CHAPARRAL, BROADLEAF"	C	0.20	0.25	1.000	75	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	C	0.50	0.25	1.000	77	9.13

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA RUNOFF (CFS) = 2.59  
TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 2.59

\*\*\*\*\*  
FLOW PROCESS FROM NODE 811.00 TO NODE 812.00 IS CODE = 51  
-----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 705.00 DOWNSTREAM (FEET) = 525.00  
CHANNEL LENGTH THRU SUBAREA (FEET) = 695.00 CHANNEL SLOPE = 0.2590  
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.188

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SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	D	2.10	0.20	1.000	83
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	C	3.10	0.25	1.000	75
NATURAL FAIR COVER					
"OPEN BRUSH"	C	3.20	0.25	1.000	77

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 13.74  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 9.17  
AVERAGE FLOW DEPTH (FEET) = 0.71 TRAVEL TIME (MIN.) = 1.26  
Tc (MIN.) = 10.39  
SUBAREA AREA (ACRES) = 8.40 SUBAREA RUNOFF (CFS) = 22.31  
EFFECTIVE AREA (ACRES) = 9.30 AREA-AVERAGED Fm (INCH/HR) = 0.24  
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 1.00  
TOTAL AREA (ACRES) = 9.3 PEAK FLOW RATE (CFS) = 24.70

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH (FEET) = 0.88 FLOW VELOCITY (FEET/SEC.) = 10.58  
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 812.00 = 1002.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 812.00 TO NODE 813.00 IS CODE = 51  
-----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 525.00 DOWNSTREAM (FEET) = 460.00  
CHANNEL LENGTH THRU SUBAREA (FEET) = 1010.00 CHANNEL SLOPE = 0.0644  
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.840

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SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	0.10	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND, GRASS"	B	0.70	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	D	1.20	0.20	1.000	81
NATURAL FAIR COVER					
"OPEN BRUSH"	C	5.80	0.25	1.000	77
NATURAL FAIR COVER					
"OPEN BRUSH"	D	6.30	0.20	1.000	83

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 41.64  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.15  
AVERAGE FLOW DEPTH (FEET) = 1.39 TRAVEL TIME (MIN.) = 2.35  
Tc (MIN.) = 12.75  
SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 33.86

EFFECTIVE AREA(ACRES) = 23.70 AREA-AVERAGED Fm(INCH/HR) = 0.23  
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 23.7 PEAK FLOW RATE(CFS) = 55.64

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH(FEET) = 1.55 FLOW VELOCITY(FEET/SEC.) = 7.68  
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 813.00 = 2012.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 813.00 TO NODE 813.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 12.75  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.84  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
NATURAL FAIR COVER  
"CHAPARRAL,BROADLEAF" C 10.40 0.25 1.000 75  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 24.24  
EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 1.00  
TOTAL AREA(ACRES) = 34.1 PEAK FLOW RATE(CFS) = 79.88

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 813.00 TO NODE 808.00 IS CODE = 31

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

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 460.00 DOWNSTREAM(FEET) = 398.00  
FLOW LENGTH(FEET) = 1046.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.64  
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 79.88  
PIPE TRAVEL TIME(MIN.) = 0.81 Tc(MIN.) = 13.55  
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 808.00 = 3058.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 1

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

-----  
TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
TIME OF CONCENTRATION(MIN.) = 13.55  
RAINFALL INTENSITY(INCH/HR) = 2.74  
AREA-AVERAGED Fm(INCH/HR) = 0.24  
AREA-AVERAGED Fp(INCH/HR) = 0.24  
AREA-AVERAGED Ap = 1.00  
EFFECTIVE STREAM AREA(ACRES) = 34.10  
TOTAL STREAM AREA(ACRES) = 34.10  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 79.88

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	169.95	8.97	3.465	0.27( 0.07)	0.28	55.7	800.00
2	79.88	13.55	2.743	0.24( 0.24)	1.00	34.1	810.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	238.06	8.97	3.465	0.25( 0.12)	0.49	78.3	800.00
2	213.67	13.55	2.743	0.25( 0.14)	0.55	89.8	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 238.06 Tc(MIN.) = 8.97  
EFFECTIVE AREA(ACRES) = 78.27 AREA-AVERAGED Fm(INCH/HR) = 0.12  
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.49  
TOTAL AREA(ACRES) = 89.8  
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 808.00 = 3058.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 808.00 TO NODE 809.00 IS CODE = 31

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

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM(FEET) = 398.00 DOWNSTREAM(FEET) = 341.00  
FLOW LENGTH(FEET) = 756.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.4 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.86  
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 238.06  
PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 9.38  
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 809.00 = 3814.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 IS CODE = 81

-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
MAINLINE Tc(MIN.) = 9.38  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.379  
SUBAREA LOSS RATE DATA(AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
APARTMENTS A 5.60 0.40 0.200 32  
APARTMENTS B 12.30 0.30 0.200 56  
COMMERCIAL A 0.50 0.40 0.100 32  
COMMERCIAL B 5.40 0.30 0.100 56  
RESIDENTIAL  
".4 DWELLING/ACRE" A 4.70 0.40 0.900 32  
RESIDENTIAL  
".4 DWELLING/ACRE" B 4.20 0.30 0.900 56  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.34  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.372

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SUBAREA AREA (ACRES) = 32.70 SUBAREA RUNOFF (CFS) = 95.66  
EFFECTIVE AREA (ACRES) = 110.97 AREA-AVERAGED Fm (INCH/HR) = 0.12  
AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.45  
TOTAL AREA (ACRES) = 122.5 PEAK FLOW RATE (CFS) = 325.11

\*\*\*\*\*  
FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 9.38  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.379 **E-5**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL A 9.90 0.40 0.100 32  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.40  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
SUBAREA AREA (ACRES) = 9.90 SUBAREA RUNOFF (CFS) = 29.75  
EFFECTIVE AREA (ACRES) = 120.87 AREA-AVERAGED Fm (INCH/HR) = 0.12  
AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.42  
TOTAL AREA (ACRES) = 132.4 PEAK FLOW RATE (CFS) = 354.85

\*\*\*\*\*  
FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 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.) = 9.38  
RAINFALL INTENSITY (INCH/HR) = 3.38  
AREA-AVERAGED Fm (INCH/HR) = 0.12  
AREA-AVERAGED Fp (INCH/HR) = 0.27  
AREA-AVERAGED Ap = 0.42  
EFFECTIVE STREAM AREA (ACRES) = 120.87  
TOTAL STREAM AREA (ACRES) = 132.40  
PEAK FLOW RATE (CFS) AT CONFLUENCE = 354.85

\*\*\*\*\*  
FLOW PROCESS FROM NODE 818.00 TO NODE 819.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH (FEET) = 323.00  
ELEVATION DATA: UPSTREAM (FEET) = 625.00 DOWNSTREAM (FEET) = 517.00

$Tc = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 8.864  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.488 **OE-4**  
SUBAREA Tc AND LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)  
NATURAL FAIR COVER  
"CHAPARRAL, BROADLEAF" D 0.10 0.20 1.000 81 8.86  
NATURAL FAIR COVER  
"OPEN BRUSH" C 0.30 0.25 1.000 77 8.86

NATURAL FAIR COVER  
"CHAPARRAL, BROADLEAF" C 0.60 0.25 1.000 75 8.86  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA RUNOFF (CFS) = 2.92  
TOTAL AREA (ACRES) = 1.00 PEAK FLOW RATE (CFS) = 2.92

\*\*\*\*\*  
FLOW PROCESS FROM NODE 819.00 TO NODE 820.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM (FEET) = 517.00 DOWNSTREAM (FEET) = 395.00  
CHANNEL LENGTH THRU SUBAREA (FEET) = 1167.00 CHANNEL SLOPE = 0.1045  
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 20.00 **OE-5**  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.958  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
COMMERCIAL C 0.10 0.25 0.100 69  
RESIDENTIAL  
".4 DWELLING/ACRE" B 0.90 0.30 0.900 56  
COMMERCIAL B 1.30 0.30 0.100 56  
NATURAL FAIR COVER  
"OPEN BRUSH" D 0.80 0.20 1.000 83  
NATURAL FAIR COVER  
"OPEN BRUSH" C 2.40 0.25 1.000 77  
NATURAL FAIR COVER  
"CHAPARRAL, BROADLEAF" D 3.20 0.20 1.000 81  
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.845  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 13.80  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.49  
AVERAGE FLOW DEPTH (FEET) = 0.84 TRAVEL TIME (MIN.) = 3.00  
Tc (MIN.) = 11.86  
SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 21.65  
EFFECTIVE AREA (ACRES) = 9.70 AREA-AVERAGED Fm (INCH/HR) = 0.20  
AREA-AVERAGED Fp (INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.86  
TOTAL AREA (ACRES) = 9.7 PEAK FLOW RATE (CFS) = 24.09

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH (FEET) = 1.03 FLOW VELOCITY (FEET/SEC.) = 7.50  
LONGEST FLOWPATH FROM NODE 818.00 TO NODE 820.00 = 1490.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 11.86  
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.958 **OE-5**  
SUBAREA LOSS RATE DATA (AMC II):  
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
NATURAL FAIR COVER  
"CHAPARRAL, BROADLEAF" B 4.00 0.30 1.000 63

NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" C 7.10 0.25 1.000 75  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 26.87  
 EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.24  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.94  
 TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 50.96

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 11.86  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.958  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	3.40	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	1.80	0.25	1.000	75
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	3.60	0.20	1.000	81
COMMERCIAL	B	1.00	0.30	0.100	56
NATURAL FAIR COVER					
"GRASS"	B	0.10	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.50	0.30	1.000	66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.913					
SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 25.53					
EFFECTIVE AREA(ACRES) = 31.20 AREA-AVERAGED Fm(INCH/HR) = 0.23					
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.93					
TOTAL AREA(ACRES) = 31.2 PEAK FLOW RATE(CFS) = 76.49					

OE-6

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 11.86  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.958  
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	C	4.60	0.25	1.000	77
NATURAL FAIR COVER					
"OPEN BRUSH"	D	2.60	0.20	1.000	83
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.997					
SUBAREA AREA(ACRES) = 7.40 SUBAREA RUNOFF(CFS) = 18.15					
EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.23					
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.94					

OE-6

TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 94.64

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 820.00 TO NODE 817.00 IS CODE = 31  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 395.00 DOWNSTREAM(FEET) = 340.00  
 FLOW LENGTH(FEET) = 1232.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.18  
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 94.64  
 PIPE TRAVEL TIME(MIN.) = 1.02 Tc(MIN.) = 12.88  
 LONGEST FLOWPATH FROM NODE 818.00 TO NODE 817.00 = 2722.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 817.00 TO NODE 817.00 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.) = 12.88  
 RAINFALL INTENSITY(INCH/HR) = 2.82  
 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.25  
 AREA-AVERAGED Ap = 0.94  
 EFFECTIVE STREAM AREA(ACRES) = 38.60  
 TOTAL STREAM AREA(ACRES) = 38.60  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 94.64

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	354.85	9.38	3.379	0.27( 0.12)	0.42	120.9	800.00
1	306.06	13.98	2.696	0.27( 0.13)	0.47	132.4	810.00
2	94.64	12.88	2.823	0.25( 0.23)	0.94	38.6	818.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	438.55	9.38	3.379	0.27( 0.14)	0.52	149.0	800.00
2	412.36	12.88	2.823	0.26( 0.15)	0.57	168.2	818.00
3	396.03	13.98	2.696	0.26( 0.15)	0.58	171.0	810.00

\*\*\*\*\*  
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 438.55 Tc(MIN.) = 9.38  
 EFFECTIVE AREA(ACRES) = 148.98 AREA-AVERAGED Fm(INCH/HR) = 0.14  
 AREA-AVERAGED Fp(INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.52  
 TOTAL AREA(ACRES) = 171.0  
 LONGEST FLOWPATH FROM NODE 810.00 TO NODE 817.00 = 3814.00 FEET.  
 -----

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 171.0 TC (MIN.) = 9.38  
EFFECTIVE AREA (ACRES) = 148.98 AREA-AVERAGED Fm (INCH/HR) = 0.14  
AREA-AVERAGED Fp (INCH/HR) = 0.27 AREA-AVERAGED Ap = 0.522  
PEAK FLOW RATE (CFS) = 438.55

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	438.55	9.38	3.379	0.27 ( 0.14)	0.52	149.0	800.00
2	412.36	12.88	2.823	0.26 ( 0.15)	0.57	168.2	818.00
3	396.03	13.98	2.696	0.26 ( 0.15)	0.58	171.0	810.00

=====  
END OF RATIONAL METHOD ANALYSIS



SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.142

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.679

OF-1

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER						
"CHAPARRAL,BROADLEAF"	C	0.10	0.25	1.000	91	8.14
NATURAL FAIR COVER						
"CHAPARRAL,BROADLEAF"	D	0.50	0.20	1.000	95	8.14
NATURAL FAIR COVER						
"OPEN BRUSH"	D	1.00	0.20	1.000	96	8.14
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000						
SUBAREA RUNOFF(CFS) = 6.45						
TOTAL AREA(ACRES) = 1.60 PEAK FLOW RATE(CFS) = 6.45						

\*\*\*\*\*

FLOW PROCESS FROM NODE 911.00 TO NODE 912.00 IS CODE = 51

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

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 612.00 DOWNSTREAM(FEET) = 525.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 458.00 CHANNEL SLOPE = 0.1900  
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.404

OF-2

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	1.00	0.25	1.000	91
NATURAL FAIR COVER					
"OPEN BRUSH"	C	0.60	0.25	1.000	92
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	2.30	0.20	1.000	95
NATURAL FAIR COVER					
"OPEN BRUSH"	D	1.00	0.20	1.000	96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.69					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.41					
AVERAGE FLOW DEPTH(FEET) = 0.79 TRAVEL TIME(MIN.) = 0.91					
Tc(MIN.) = 9.05					
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 18.47					
EFFECTIVE AREA(ACRES) = 6.50 AREA-AVERAGED Fm(INCH/HR) = 0.21					
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 1.00					
TOTAL AREA(ACRES) = 6.5 PEAK FLOW RATE(CFS) = 24.52					

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.93 FLOW VELOCITY(FEET/SEC.) = 9.38  
LONGEST FLOWPATH FROM NODE 910.00 TO NODE 912.00 = 786.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 912.00 TO NODE 913.00 IS CODE = 51

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

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 525.00 DOWNSTREAM(FEET) = 470.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 618.00 CHANNEL SLOPE = 0.0890  
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.103

OF-3

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.10	0.30	1.000	84
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	4.60	0.25	1.000	91
NATURAL FAIR COVER					
"OPEN BRUSH"	C	4.00	0.25	1.000	92
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	0.60	0.25	1.000	92
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	2.70	0.20	1.000	95
NATURAL FAIR COVER					
"OPEN BRUSH"	D	5.10	0.20	1.000	96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 54.35					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.66					
AVERAGE FLOW DEPTH(FEET) = 1.45 TRAVEL TIME(MIN.) = 1.19					
Tc(MIN.) = 10.24					
SUBAREA AREA(ACRES) = 17.10 SUBAREA RUNOFF(CFS) = 59.65					
EFFECTIVE AREA(ACRES) = 23.60 AREA-AVERAGED Fm(INCH/HR) = 0.22					
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00					
TOTAL AREA(ACRES) = 23.6 PEAK FLOW RATE(CFS) = 82.40					

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.69 FLOW VELOCITY(FEET/SEC.) = 9.61  
LONGEST FLOWPATH FROM NODE 910.00 TO NODE 913.00 = 1404.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 913.00 TO NODE 902.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 470.00 DOWNSTREAM(FEET) = 459.00  
 FLOW LENGTH(FEET) = 890.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.2 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.94  
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 82.40  
 PIPE TRAVEL TIME(MIN.) = 1.24 Tc(MIN.) = 11.48  
 LONGEST FLOWPATH FROM NODE 910.00 TO NODE 902.00 = 2294.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 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.) = 11.48  
 RAINFALL INTENSITY (INCH/HR) = 3.84  
 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.22  
 AREA-AVERAGED Ap = 1.00  
 EFFECTIVE STREAM AREA(ACRES) = 23.60  
 TOTAL STREAM AREA(ACRES) = 23.60  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 82.40

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.52	16.33	3.140	0.20( 0.20)	1.00	1.2	900.00
2	82.40	11.48	3.843	0.22( 0.22)	1.00	23.6	910.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	85.47	11.48	3.843	0.22( 0.22)	1.00	24.4	910.00
2	69.93	16.33	3.140	0.22( 0.22)	1.00	24.8	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 85.47 Tc(MIN.) = 11.48  
 EFFECTIVE AREA(ACRES) = 24.44 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 24.8  
 LONGEST FLOWPATH FROM NODE 910.00 TO NODE 902.00 = 2294.00 FEET.

F-2

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 11.48  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.843  
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	0.20	0.30	1.000	81
COMMERCIAL	B	5.50	0.30	0.100	76
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.20	0.30	1.000	84
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	76
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	0.10	0.25	1.000	91
COMMERCIAL	C	1.00	0.25	0.100	86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.29  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.175  
 SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 24.23  
 EFFECTIVE AREA(ACRES) = 31.54 AREA-AVERAGED Fm(INCH/HR) = 0.18  
 AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.81  
 TOTAL AREA(ACRES) = 31.9 PEAK FLOW RATE(CFS) = 103.86

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

\*\*\*\*\*  
 MAINLINE Tc(MIN.) = 11.48  
 \* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.843  
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	C	0.20	0.25	1.000	92
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.10	0.25	0.900	86
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	3.20	0.20	1.000	95
COMMERCIAL	D	3.40	0.20	0.100	91
NATURAL FAIR COVER					
"OPEN BRUSH"	D	3.30	0.20	1.000	96
RESIDENTIAL					
".4 DWELLING/ACRE"	D	0.70	0.20	0.900	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.712  
 SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 36.29  
 EFFECTIVE AREA(ACRES) = 42.44 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.79  
 TOTAL AREA(ACRES) = 42.8 PEAK FLOW RATE(CFS) = 140.15

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\*\*\*\*\*  
 FLOW PROCESS FROM NODE 902.00 TO NODE 903.00 IS CODE = 31  
 -----

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

\*\*\*\*\*  
 ELEVATION DATA: UPSTREAM(FEET) = 459.00 DOWNSTREAM(FEET) = 426.00  
 FLOW LENGTH(FEET) = 654.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.1 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.92  
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 140.15  
 PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 11.96  
 LONGEST FLOWPATH FROM NODE 910.00 TO NODE 903.00 = 2948.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 903.00 TO NODE 903.00 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.) = 11.96  
 RAINFALL INTENSITY (INCH/HR) = 3.75  
 AREA-AVERAGED Fm(INCH/HR) = 0.17  
 AREA-AVERAGED Fp(INCH/HR) = 0.22  
 AREA-AVERAGED Ap = 0.79  
 EFFECTIVE STREAM AREA(ACRES) = 42.44  
 TOTAL STREAM AREA(ACRES) = 42.80

PEAK FLOW RATE(CFS) AT CONFLUENCE = 140.15

\*\*\*\*\*

FLOW PROCESS FROM NODE 920.00 TO NODE 921.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 286.00
ELEVATION DATA: UPSTREAM(FEET) = 860.00 DOWNSTREAM(FEET) = 712.00

Tc = K\*[LENGTH\*\* 3.00]/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.737
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.818
SUBAREA Tc AND LOSS RATE DATA(AMC III):

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Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include NATURAL FAIR COVER, OPEN BRUSH, and SUBAREA AVERAGE PERVIOUS LOSS RATE.

\*\*\*\*\*

FLOW PROCESS FROM NODE 921.00 TO NODE 922.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 712.00 DOWNSTREAM(FEET) = 600.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 594.00 CHANNEL SLOPE = 0.1886
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.493

OF-5

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include WOODLAND,GRASS, CHAPARRAL,BROADLEAF, OPEN BRUSH, and SUBAREA AVERAGE PERVIOUS LOSS RATE.

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 56.29

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.28 FLOW VELOCITY(FEET/SEC.) = 11.51
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 922.00 = 880.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 922.00 TO NODE 923.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 600.00 DOWNSTREAM(FEET) = 550.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 604.00 CHANNEL SLOPE = 0.0828
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.191

OF-6

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include CHAPARRAL,BROADLEAF, WOODLAND,GRASS, OPEN BRUSH, and SUBAREA AVERAGE PERVIOUS LOSS RATE.

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.69 FLOW VELOCITY(FEET/SEC.) = 9.24
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 923.00 = 1484.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 923.00 TO NODE 924.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 550.00 DOWNSTREAM(FEET) = 495.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 849.00 CHANNEL SLOPE = 0.0648
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.851

OF-7

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include WOODLAND,GRASS.

NATURAL FAIR COVER  
 "WOODLAND,GRASS" C 0.80 0.25 1.000 92  
 NATURAL FAIR COVER  
 "OPEN BRUSH" B 0.80 0.30 1.000 84  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" B 1.10 0.30 1.000 81  
 NATURAL FAIR COVER  
 "WOODLAND,GRASS" D 5.20 0.20 1.000 95  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" C 6.30 0.25 1.000 91  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 103.33  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.00  
 AVERAGE FLOW DEPTH(FEET) = 1.96 TRAVEL TIME(MIN.) = 1.57  
 Tc(MIN.) = 11.44  
 SUBAREA AREA(ACRES) = 14.80 SUBAREA RUNOFF(CFS) = 48.09  
 EFFECTIVE AREA(ACRES) = 36.90 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 36.9 PEAK FLOW RATE(CFS) = 120.58

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 2.07 FLOW VELOCITY(FEET/SEC.) = 9.36  
 LONGEST FLOWPATH FROM NODE 920.00 TO NODE 924.00 = 2333.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 924.00 TO NODE 924.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 11.44  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.851  
 SUBAREA LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 NATURAL FAIR COVER  
 "OPEN BRUSH" C 9.70 0.25 1.000 92  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" D 17.00 0.20 1.000 95  
 NATURAL FAIR COVER  
 "OPEN BRUSH" D 36.60 0.20 1.000 96  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 63.30 SUBAREA RUNOFF(CFS) = 207.56  
 EFFECTIVE AREA(ACRES) = 100.20 AREA-AVERAGED Fm(INCH/HR) = 0.21  
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 100.2 PEAK FLOW RATE(CFS) = 328.14

OF-7

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 924.00 TO NODE 925.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 495.00 DOWNSTREAM(FEET) = 457.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 607.00 CHANNEL SLOPE = 0.0626  
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00

\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.696  
 SUBAREA LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" B 0.10 0.30 1.000 81  
 NATURAL FAIR COVER  
 "WOODLAND,GRASS" B 0.30 0.30 1.000 83  
 NATURAL FAIR COVER  
 "GRASS" C 0.60 0.25 1.000 93  
 NATURAL FAIR COVER  
 "OPEN BRUSH" B 0.70 0.30 1.000 84  
 NATURAL FAIR COVER  
 "WOODLAND,GRASS" D 0.90 0.20 1.000 95  
 NATURAL FAIR COVER  
 "GRASS" B 0.90 0.30 1.000 86  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 333.54  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.90  
 AVERAGE FLOW DEPTH(FEET) = 3.06 TRAVEL TIME(MIN.) = 0.85  
 Tc(MIN.) = 12.29  
 SUBAREA AREA(ACRES) = 3.50 SUBAREA RUNOFF(CFS) = 10.81  
 EFFECTIVE AREA(ACRES) = 103.70 AREA-AVERAGED Fm(INCH/HR) = 0.21  
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 103.7 PEAK FLOW RATE(CFS) = 328.14  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

OF-8

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 3.04 FLOW VELOCITY(FEET/SEC.) = 11.84  
 LONGEST FLOWPATH FROM NODE 920.00 TO NODE 925.00 = 2940.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 925.00 TO NODE 925.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 12.29  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.696  
 SUBAREA LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 NATURAL FAIR COVER  
 "OPEN BRUSH" D 3.80 0.20 1.000 96  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" D 4.20 0.20 1.000 95  
 NATURAL FAIR COVER  
 "WOODLAND,GRASS" C 5.10 0.25 1.000 92  
 NATURAL FAIR COVER  
 "OPEN BRUSH" C 7.00 0.25 1.000 92  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" C 12.00 0.25 1.000 91  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 32.10 SUBAREA RUNOFF(CFS) = 99.91  
 EFFECTIVE AREA(ACRES) = 135.80 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 135.8 PEAK FLOW RATE(CFS) = 424.88

OF-8

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*****
FLOW PROCESS FROM NODE 925.00 TO NODE 926.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 457.00 DOWNSTREAM(FEET) = 440.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 884.00 CHANNEL SLOPE = 0.0192
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.418
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"GRASS" D 0.50 0.20 1.000 96
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 0.70 0.30 1.000 81
NATURAL FAIR COVER
"WOODLAND,GRASS" C 2.30 0.25 1.000 92
NATURAL FAIR COVER
"OPEN BRUSH" B 2.40 0.30 1.000 84
NATURAL FAIR COVER
"GRASS" B 2.50 0.30 1.000 86
NATURAL FAIR COVER
"GRASS" C 3.20 0.25 1.000 93
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 441.31
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.19
AVERAGE FLOW DEPTH(FEET) = 4.24 TRAVEL TIME(MIN.) = 1.80
Tc(MIN.) = 14.09
SUBAREA AREA(ACRES) = 11.60 SUBAREA RUNOFF(CFS) = 32.84
EFFECTIVE AREA(ACRES) = 147.40 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 147.4 PEAK FLOW RATE(CFS) = 424.88
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

OF-9

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 4.18 FLOW VELOCITY(FEET/SEC.) = 8.12
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 926.00 = 3824.00 FEET.
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*****
FLOW PROCESS FROM NODE 926.00 TO NODE 926.00 IS CODE = 81
-----
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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-----
MAINLINE Tc(MIN.) = 14.09
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.418
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"WOODLAND,GRASS" D 7.40 0.20 1.000 95
NATURAL FAIR COVER
"OPEN BRUSH" C 12.40 0.25 1.000 92
NATURAL FAIR COVER
```

OF-9

```
"OPEN BRUSH" D 28.20 0.20 1.000 96
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" D 31.40 0.20 1.000 95
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" C 42.40 0.25 1.000 91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 121.80 SUBAREA RUNOFF(CFS) = 350.26
EFFECTIVE AREA(ACRES) = 269.20 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 269.2 PEAK FLOW RATE(CFS) = 773.99
```

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*****
FLOW PROCESS FROM NODE 926.00 TO NODE 903.00 IS CODE = 31
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```
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
```

```
-----
ELEVATION DATA: UPSTREAM(FEET) = 440.00 DOWNSTREAM(FEET) = 426.00
FLOW LENGTH(FEET) = 1341.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 93.0 INCH PIPE IS 72.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.60
ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 773.99
PIPE TRAVEL TIME(MIN.) = 1.14 Tc(MIN.) = 15.23
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 903.00 = 5165.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 903.00 TO NODE 903.00 IS CODE = 1
-----
```

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

```
-----
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.23
RAINFALL INTENSITY(INCH/HR) = 3.27
AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 269.20
TOTAL STREAM AREA(ACRES) = 269.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 773.99
```

```
*****
FLOW PROCESS FROM NODE 930.00 TO NODE 931.00 IS CODE = 21
-----
```

```
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 715.00 DOWNSTREAM(FEET) = 517.00
```

```
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.954
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.742
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
```

OF-10

NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" C 0.60 0.25 1.000 91 7.95  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA RUNOFF(CFS) = 2.43  
 TOTAL AREA (ACRES) = 0.60 PEAK FLOW RATE (CFS) = 2.43

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 931.00 TO NODE 932.00 IS CODE = 51  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 517.00 DOWNSTREAM(FEET) = 430.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 443.00 CHANNEL SLOPE = 0.1964  
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.452

OF-11

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.10	0.25	0.900	86
COMMERCIAL	C	0.40	0.25	0.100	86
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	0.30	0.25	1.000	92
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	4.30	0.25	1.000	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.927  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.11  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.96  
 AVERAGE FLOW DEPTH(FEET) = 0.71 TRAVEL TIME(MIN.) = 0.93  
 Tc(MIN.) = 8.88  
 SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 19.37  
 EFFECTIVE AREA(ACRES) = 5.70 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.94  
 TOTAL AREA(ACRES) = 5.7 PEAK FLOW RATE(CFS) = 21.64

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.88 FLOW VELOCITY(FEET/SEC.) = 9.27  
 LONGEST FLOWPATH FROM NODE 930.00 TO NODE 932.00 = 773.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 932.00 TO NODE 903.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 430.00 DOWNSTREAM(FEET) = 426.00  
 FLOW LENGTH(FEET) = 254.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.53  
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 21.64  
 PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 9.33  
 LONGEST FLOWPATH FROM NODE 930.00 TO NODE 903.00 = 1027.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 903.00 TO NODE 903.00 IS CODE = 1  
 -----

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

-----  
 TOTAL NUMBER OF STREAMS = 3  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:  
 TIME OF CONCENTRATION(MIN.) = 9.33  
 RAINFALL INTENSITY(INCH/HR) = 4.33  
 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.25  
 AREA-AVERAGED Ap = 0.94  
 EFFECTIVE STREAM AREA(ACRES) = 5.70  
 TOTAL STREAM AREA(ACRES) = 5.70  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 21.64

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	140.15	11.96	3.754	0.22( 0.17)	0.79	42.4	910.00
1	114.25	16.82	3.088	0.22( 0.17)	0.79	42.8	900.00
2	773.99	15.23	3.269	0.22( 0.22)	1.00	269.2	920.00
3	21.64	9.33	4.329	0.25( 0.23)	0.94	5.7	930.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	787.54	9.33	4.329	0.22( 0.22)	0.96	203.7	930.00
2	863.45	11.96	3.754	0.22( 0.22)	0.96	259.5	910.00
3	912.76	15.23	3.269	0.22( 0.22)	0.97	317.6	920.00
4	857.28	16.82	3.088	0.22( 0.22)	0.97	317.7	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 912.76 Tc(MIN.) = 15.23  
 EFFECTIVE AREA(ACRES) = 317.58 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.97  
 TOTAL AREA(ACRES) = 317.7  
 LONGEST FLOWPATH FROM NODE 920.00 TO NODE 903.00 = 5165.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 903.00 TO NODE 903.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

-----  
 MAINLINE Tc(MIN.) = 15.23  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.269

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SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.50	0.25	0.900	86
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.10	0.30	0.900	76
RESIDENTIAL					

```

".4 DWELLING/ACRE"      D      3.00   0.20   0.900   91
COMMERCIAL              D      5.90   0.20   0.100   91
COMMERCIAL              C      7.70   0.25   0.100   86
COMMERCIAL              B     13.60   0.30   0.100   76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.237
SUBAREA AREA (ACRES) = 32.80   SUBAREA RUNOFF (CFS) = 94.75
EFFECTIVE AREA (ACRES) = 350.38   AREA-AVERAGED Fm (INCH/HR) = 0.20
AREA-AVERAGED Fp (INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.90
TOTAL AREA (ACRES) = 350.5   PEAK FLOW RATE (CFS) = 967.07

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*****
FLOW PROCESS FROM NODE 903.00 TO NODE 904.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 426.00   DOWNSTREAM(FEET) = 370.00
FLOW LENGTH(FEET) = 896.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 72.0 INCH PIPE IS 56.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 40.46
ESTIMATED PIPE DIAMETER(INCH) = 72.00   NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 967.07
PIPE TRAVEL TIME (MIN.) = 0.37   Tc (MIN.) = 15.60
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 904.00 = 6061.00 FEET.

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*****
FLOW PROCESS FROM NODE 904.00 TO NODE 904.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc (MIN.) = 15.60
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.224
SUBAREA LOSS RATE DATA (AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B      3.80   0.30  0.100  76
COMMERCIAL          C      0.60   0.25  0.100  86
NATURAL FAIR COVER
"GRASS"             B      0.10   0.30  1.000  86
RESIDENTIAL
".4 DWELLING/ACRE" B      2.40   0.30  0.900  76
RESIDENTIAL
".4 DWELLING/ACRE" C      2.20   0.25  0.900  86
RESIDENTIAL
".4 DWELLING/ACRE" D      0.30   0.20  0.900  91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA (ACRES) = 9.40   SUBAREA RUNOFF (CFS) = 26.06
EFFECTIVE AREA (ACRES) = 359.78   AREA-AVERAGED Fm (INCH/HR) = 0.20
AREA-AVERAGED Fp (INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.89
TOTAL AREA (ACRES) = 359.9   PEAK FLOW RATE (CFS) = 979.08

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*****
FLOW PROCESS FROM NODE 904.00 TO NODE 905.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 370.00   DOWNSTREAM(FEET) = 330.00
FLOW LENGTH(FEET) = 872.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 36.42
ESTIMATED PIPE DIAMETER(INCH) = 78.00   NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 979.08
PIPE TRAVEL TIME (MIN.) = 0.40   Tc (MIN.) = 16.00
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 905.00 = 6933.00 FEET.

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FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
-----
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 16.00
RAINFALL INTENSITY (INCH/HR) = 3.18
AREA-AVERAGED Fm (INCH/HR) = 0.20
AREA-AVERAGED Fp (INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.89
EFFECTIVE STREAM AREA (ACRES) = 359.78
TOTAL STREAM AREA (ACRES) = 359.90
PEAK FLOW RATE (CFS) AT CONFLUENCE = 979.08

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*****
FLOW PROCESS FROM NODE 940.00 TO NODE 941.00 IS CODE = 21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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INITIAL SUBAREA FLOW-LENGTH (FEET) = 304.00
ELEVATION DATA: UPSTREAM(FEET) = 858.00   DOWNSTREAM(FEET) = 675.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 7.692
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.834
SUBAREA Tc AND LOSS RATE DATA (AMC III):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS   Tc
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL FAIR COVER
"CHAPARRAL, BROADLEAF" C      0.10   0.25  1.000  91  7.69
NATURAL FAIR COVER
"OPEN BRUSH"         C      1.10   0.25  1.000  92  7.69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 4.95
TOTAL AREA (ACRES) = 1.20   PEAK FLOW RATE (CFS) = 4.95

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*****
FLOW PROCESS FROM NODE 941.00 TO NODE 942.00 IS CODE = 51
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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 675.00   DOWNSTREAM(FEET) = 405.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 1008.00   CHANNEL SLOPE = 0.2679

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CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.390

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SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "GRASS"	B	0.10	0.30	1.000	86
NATURAL FAIR COVER "WOODLAND, GRASS"	B	0.80	0.30	1.000	83
NATURAL FAIR COVER "OPEN BRUSH"	B	1.10	0.30	1.000	84
NATURAL FAIR COVER "WOODLAND, GRASS"	C	1.50	0.25	1.000	92
NATURAL FAIR COVER "CHAPARRAL, BROADLEAF"	C	3.60	0.25	1.000	91
NATURAL FAIR COVER "OPEN BRUSH"	C	10.20	0.25	1.000	92

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.26  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 37.18  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 11.92  
AVERAGE FLOW DEPTH (FEET) = 1.02 TRAVEL TIME (MIN.) = 1.41  
Tc (MIN.) = 9.10  
SUBAREA AREA (ACRES) = 17.30 SUBAREA RUNOFF (CFS) = 64.37  
EFFECTIVE AREA (ACRES) = 18.50 AREA-AVERAGED Fm (INCH/HR) = 0.26  
AREA-AVERAGED Fp (INCH/HR) = 0.26 AREA-AVERAGED Ap = 1.00  
TOTAL AREA (ACRES) = 18.5 PEAK FLOW RATE (CFS) = 68.84

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH (FEET) = 1.29 FLOW VELOCITY (FEET/SEC.) = 13.86  
LONGEST FLOWPATH FROM NODE 940.00 TO NODE 942.00 = 1312.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 942.00 TO NODE 905.00 IS CODE = 31  
-----

>>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
-----  
ELEVATION DATA: UPSTREAM (FEET) = 405.00 DOWNSTREAM (FEET) = 330.00  
FLOW LENGTH (FEET) = 1041.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.5 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 22.35  
ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 68.84  
PIPE TRAVEL TIME (MIN.) = 0.78 Tc (MIN.) = 9.88  
LONGEST FLOWPATH FROM NODE 940.00 TO NODE 905.00 = 2353.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 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.) = 9.88  
RAINFALL INTENSITY (INCH/HR) = 4.19  
AREA-AVERAGED Fm (INCH/HR) = 0.26

AREA-AVERAGED Fp (INCH/HR) = 0.26  
AREA-AVERAGED Ap = 1.00  
EFFECTIVE STREAM AREA (ACRES) = 18.50  
TOTAL STREAM AREA (ACRES) = 18.50  
PEAK FLOW RATE (CFS) AT CONFLUENCE = 68.84

\*\*\*\*\*  
FLOW PROCESS FROM NODE 950.00 TO NODE 951.00 IS CODE = 21  
-----

>>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>> USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
-----

INITIAL SUBAREA FLOW-LENGTH (FEET) = 328.00  
ELEVATION DATA: UPSTREAM (FEET) = 1053.00 DOWNSTREAM (FEET) = 990.00

Tc = K \* [(LENGTH\*\* 3.00) / (ELEVATION CHANGE)]\*\* 0.20  
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.965  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.168  
SUBAREA Tc AND LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "OPEN BRUSH"	C	0.40	0.25	1.000	92	9.96
NATURAL FAIR COVER "OPEN BRUSH"	D	1.00	0.20	1.000	96	9.96

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.21  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA RUNOFF (CFS) = 4.98  
TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 4.98

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\*\*\*\*\*  
FLOW PROCESS FROM NODE 951.00 TO NODE 952.00 IS CODE = 51  
-----

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

ELEVATION DATA: UPSTREAM (FEET) = 990.00 DOWNSTREAM (FEET) = 950.00  
CHANNEL LENGTH THRU SUBAREA (FEET) = 439.00 CHANNEL SLOPE = 0.0911  
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.875

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SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	D	0.10	0.20	1.000	96
NATURAL FAIR COVER "OPEN BRUSH"	C	0.40	0.25	1.000	92
NATURAL FAIR COVER "GRASS"	C	0.60	0.25	1.000	93
NATURAL FAIR COVER "GRASS"	D	0.70	0.20	1.000	96

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 7.94  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.41  
AVERAGE FLOW DEPTH (FEET) = 0.70 TRAVEL TIME (MIN.) = 1.35  
Tc (MIN.) = 11.32

SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 5.91  
EFFECTIVE AREA (ACRES) = 3.20 AREA-AVERAGED Fm (INCH/HR) = 0.22  
AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00  
TOTAL AREA (ACRES) = 3.2 PEAK FLOW RATE (CFS) = 10.52

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH (FEET) = 0.78 FLOW VELOCITY (FEET/SEC.) = 5.75  
LONGEST FLOWPATH FROM NODE 950.00 TO NODE 952.00 = 767.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 952.00 TO NODE 953.00 IS CODE = 51  
-----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 950.00 DOWNSTREAM (FEET) = 675.00  
CHANNEL LENGTH THRU SUBAREA (FEET) = 810.00 CHANNEL SLOPE = 0.3395  
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.678

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	D	0.60	0.20	1.000	95
NATURAL FAIR COVER					
"GRASS"	D	1.50	0.20	1.000	96
NATURAL FAIR COVER					
"GRASS"	C	1.70	0.25	1.000	93
NATURAL FAIR COVER					
"OPEN BRUSH"	C	3.40	0.25	1.000	92
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	C	7.20	0.25	1.000	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 32.79  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 12.54  
AVERAGE FLOW DEPTH (FEET) = 0.93 TRAVEL TIME (MIN.) = 1.08  
Tc (MIN.) = 12.39  
SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 44.52  
EFFECTIVE AREA (ACRES) = 17.60 AREA-AVERAGED Fm (INCH/HR) = 0.24  
AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 1.00  
TOTAL AREA (ACRES) = 17.6 PEAK FLOW RATE (CFS) = 54.48

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH (FEET) = 1.13 FLOW VELOCITY (FEET/SEC.) = 14.32  
LONGEST FLOWPATH FROM NODE 950.00 TO NODE 953.00 = 1577.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 953.00 TO NODE 954.00 IS CODE = 51  
-----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 675.00 DOWNSTREAM (FEET) = 475.00  
CHANNEL LENGTH THRU SUBAREA (FEET) = 955.00 CHANNEL SLOPE = 0.2094  
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00

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\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.493  
SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"GRASS"	D	0.10	0.20	1.000	96
NATURAL FAIR COVER					
"OPEN BRUSH"	D	0.10	0.20	1.000	96
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	84
NATURAL FAIR COVER					
"GRASS"	C	2.10	0.25	1.000	93
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	C	8.90	0.25	1.000	91
NATURAL FAIR COVER					
"OPEN BRUSH"	C	14.80	0.25	1.000	92

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 93.31  
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 13.58  
AVERAGE FLOW DEPTH (FEET) = 1.51 TRAVEL TIME (MIN.) = 1.17  
Tc (MIN.) = 13.56  
SUBAREA AREA (ACRES) = 26.60 SUBAREA RUNOFF (CFS) = 77.61  
EFFECTIVE AREA (ACRES) = 44.20 AREA-AVERAGED Fm (INCH/HR) = 0.25  
AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
TOTAL AREA (ACRES) = 44.2 PEAK FLOW RATE (CFS) = 129.14

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
DEPTH (FEET) = 1.71 FLOW VELOCITY (FEET/SEC.) = 14.79  
LONGEST FLOWPATH FROM NODE 950.00 TO NODE 954.00 = 2532.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 954.00 TO NODE 955.00 IS CODE = 51  
-----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 475.00 DOWNSTREAM (FEET) = 410.00  
CHANNEL LENGTH THRU SUBAREA (FEET) = 814.00 CHANNEL SLOPE = 0.0799  
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.319

SUBAREA LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"GRASS"	B	0.10	0.30	1.000	86
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	D	0.40	0.20	1.000	95
NATURAL FAIR COVER					
"OPEN BRUSH"	D	0.40	0.20	1.000	96
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.90	0.30	1.000	84
NATURAL FAIR COVER					
"OPEN BRUSH"	C	5.20	0.25	1.000	92
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	C	9.50	0.25	1.000	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.26

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SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 154.65  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.78  
 AVERAGE FLOW DEPTH(FEET) = 2.19 TRAVEL TIME(MIN.) = 1.26  
 Tc(MIN.) = 14.82  
 SUBAREA AREA(ACRES) = 18.50 SUBAREA RUNOFF(CFS) = 51.01  
 EFFECTIVE AREA(ACRES) = 62.70 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 62.7 PEAK FLOW RATE(CFS) = 173.26

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 2.28 FLOW VELOCITY(FEET/SEC.) = 11.07  
 LONGEST FLOWPATH FROM NODE 950.00 TO NODE 955.00 = 3346.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 955.00 TO NODE 956.00 IS CODE = 51  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 410.00 DOWNSTREAM(FEET) = 375.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 643.00 CHANNEL SLOPE = 0.0544  
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.187

OF-20

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	0.20	0.30	1.000	81
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.50	0.30	1.000	83
NATURAL FAIR COVER					
"GRASS"	C	1.20	0.25	1.000	93
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	3.60	0.25	1.000	92
NATURAL FAIR COVER					
"GRASS"	B	3.80	0.30	1.000	86
NATURAL FAIR COVER					
"OPEN BRUSH"	B	6.10	0.30	1.000	84

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 193.39  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.85  
 AVERAGE FLOW DEPTH(FEET) = 2.56 TRAVEL TIME(MIN.) = 1.09  
 Tc(MIN.) = 15.91  
 SUBAREA AREA(ACRES) = 15.40 SUBAREA RUNOFF(CFS) = 40.23  
 EFFECTIVE AREA(ACRES) = 78.10 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 78.1 PEAK FLOW RATE(CFS) = 206.05

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 2.62 FLOW VELOCITY(FEET/SEC.) = 10.01  
 LONGEST FLOWPATH FROM NODE 950.00 TO NODE 956.00 = 3989.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 956.00 TO NODE 956.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----

MAINLINE Tc(MIN.) = 15.91  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.187  
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	14.30	0.25	1.000	91
NATURAL FAIR COVER					
"OPEN BRUSH"	C	21.60	0.25	1.000	92

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 35.90 SUBAREA RUNOFF(CFS) = 94.90  
 EFFECTIVE AREA(ACRES) = 114.00 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 114.0 PEAK FLOW RATE(CFS) = 300.95

OF-20

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 956.00 TO NODE 956.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 -----

MAINLINE Tc(MIN.) = 15.91  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.187  
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	D	0.30	0.20	1.000	96
NATURAL FAIR COVER					
"OPEN BRUSH"	C	0.30	0.25	1.000	92
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	0.60	0.20	1.000	95
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	2.30	0.25	1.000	92
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	3.20	0.25	1.000	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 17.75  
 EFFECTIVE AREA(ACRES) = 120.70 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 120.7 PEAK FLOW RATE(CFS) = 318.70

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\*\*\*\*\*  
 FLOW PROCESS FROM NODE 956.00 TO NODE 905.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 375.00 DOWNSTREAM(FEET) = 330.00  
 FLOW LENGTH(FEET) = 1304.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 24.72  
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 318.70  
 PIPE TRAVEL TIME(MIN.) = 0.88 Tc(MIN.) = 16.79

LONGEST FLOWPATH FROM NODE 950.00 TO NODE 905.00 = 5293.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 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.) = 16.79
RAINFALL INTENSITY(INCH/HR) = 3.09
AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.25
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 120.70
TOTAL STREAM AREA(ACRES) = 120.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 318.70

\*\* CONFLUENCE DATA \*\*

Table with columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Contains 3 rows of data.

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

\*\* PEAK FLOW RATE TABLE \*\*

Table with columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Contains 6 rows of data.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1343.15 Tc(MIN.) = 16.00
EFFECTIVE AREA(ACRES) = 493.26 AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.92
TOTAL AREA(ACRES) = 499.1
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 905.00 = 6933.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.00
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.178
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

Table with columns: LAND USE, GROUP, (ACRES), (INCH/HR), (DECIMAL), CN. Includes rows for COMMERCIAL and RESIDENTIAL.

RESIDENTIAL ".4 DWELLING/ACRE" A 2.70 0.40 0.900 52
RESIDENTIAL ".4 DWELLING/ACRE" B 0.80 0.30 0.900 76
RESIDENTIAL ".4 DWELLING/ACRE" C 2.10 0.25 0.900 86
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.33
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA(ACRES) = 46.70 SUBAREA RUNOFF(CFS) = 130.86
EFFECTIVE AREA(ACRES) = 539.96 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.86
TOTAL AREA(ACRES) = 545.8 PEAK FLOW RATE(CFS) = 1446.20

\*\*\*\*\*

FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.00
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.178
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 8.00 0.40 0.100 52
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 22.59
EFFECTIVE AREA(ACRES) = 547.96 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 553.8 PEAK FLOW RATE(CFS) = 1468.79

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 553.8 TC(MIN.) = 16.00
EFFECTIVE AREA(ACRES) = 547.96 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.847
PEAK FLOW RATE(CFS) = 1468.79

\*\* PEAK FLOW RATE TABLE \*\*

Table with columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Contains 6 rows of data.

END OF RATIONAL METHOD ANALYSIS



\*\*\*\*\*  
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)  
(c) Copyright 1983-2013 Advanced Engineering Software (aes)  
Ver. 20.0 Release Date: 06/01/2013 License ID 1264

Analysis prepared by:

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Santa Ana, CA 92707

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* RMV PA-4 SUBAREA F ROMP 2018 \*  
\* RATIONAL METHOD HYDROLOGY MODEL LOCAL \*  
\* 100-YR HC AUG 2018 CCHIU \*  
\*\*\*\*\*

FILE NAME: PA4F25HC.DAT  
TIME/DATE OF STUDY: 15:03 08/06/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
\*DATA BANK RAINFALL USED\*  
\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	STREET-CROSSFALL: HEIGHT (FT)	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
2	32.0	27.0	0.020/0.020/ ---	0.67	2.00	0.0312	0.167	0.0150
3	13.0	8.0	0.020/0.020/ ---	0.33	1.00	0.0312	0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:  
1. Relative Flow-Depth = 1.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)  
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)  
\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*  
\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

\*\*\*\*\*

FLOW PROCESS FROM NODE 900.00 TO NODE 901.00 IS CODE = 21

-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 314.00  
ELEVATION DATA: UPSTREAM(FEET) = 496.00 DOWNSTREAM(FEET) = 485.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.762  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.720

F-1

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	D	0.70	0.20	1.000	81	13.76
NATURAL FAIR COVER "OPEN BRUSH"	D	0.50	0.20	1.000	83	13.76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
SUBAREA RUNOFF(CFS) = 2.72  
TOTAL AREA(ACRES) = 1.20 PEAK FLOW RATE(CFS) = 2.72

\*\*\*\*\*

FLOW PROCESS FROM NODE 901.00 TO NODE 902.00 IS CODE = 31

-----

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

ELEVATION DATA: UPSTREAM(FEET) = 485.00 DOWNSTREAM(FEET) = 459.00  
FLOW LENGTH(FEET) = 1090.00 MANNING'S N = 0.013  
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000  
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.1 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.57  
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 2.72  
PIPE TRAVEL TIME(MIN.) = 2.77 Tc(MIN.) = 16.53  
LONGEST FLOWPATH FROM NODE 900.00 TO NODE 902.00 = 1404.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 1

-----

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

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 16.53  
RAINFALL INTENSITY(INCH/HR) = 2.45  
AREA-AVERAGED Fm(INCH/HR) = 0.20  
AREA-AVERAGED Fp(INCH/HR) = 0.20  
AREA-AVERAGED Ap = 1.00  
EFFECTIVE STREAM AREA(ACRES) = 1.20  
TOTAL STREAM AREA(ACRES) = 1.20  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.72

\*\*\*\*\*

FLOW PROCESS FROM NODE 910.00 TO NODE 911.00 IS CODE = 21

-----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 328.00  
ELEVATION DATA: UPSTREAM(FEET) = 785.00 DOWNSTREAM(FEET) = 612.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.142

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.660

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER						
"CHAPARRAL,BROADLEAF"	C	0.10	0.25	1.000	75	8.14
NATURAL FAIR COVER						
"CHAPARRAL,BROADLEAF"	D	0.50	0.20	1.000	81	8.14
NATURAL FAIR COVER						
"OPEN BRUSH"	D	1.00	0.20	1.000	83	8.14
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000						
SUBAREA RUNOFF(CFS) = 4.98						
TOTAL AREA(ACRES) = 1.60 PEAK FLOW RATE(CFS) = 4.98						

OF-1

\*\*\*\*\*  
FLOW PROCESS FROM NODE 911.00 TO NODE 912.00 IS CODE = 51

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

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 612.00 DOWNSTREAM(FEET) = 525.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 458.00 CHANNEL SLOPE = 0.1900  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.435

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	1.00	0.25	1.000	75
NATURAL FAIR COVER					
"OPEN BRUSH"	C	0.60	0.25	1.000	77
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	2.30	0.20	1.000	81
NATURAL FAIR COVER					
"OPEN BRUSH"	D	1.00	0.20	1.000	83

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.08

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.89

AVERAGE FLOW DEPTH(FEET) = 0.71 TRAVEL TIME(MIN.) = 0.97

Tc(MIN.) = 9.11

SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 14.19

EFFECTIVE AREA(ACRES) = 6.50 AREA-AVERAGED Fm(INCH/HR) = 0.21

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 6.5 PEAK FLOW RATE(CFS) = 18.85

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.84 FLOW VELOCITY(FEET/SEC.) = 8.82

LONGEST FLOWPATH FROM NODE 910.00 TO NODE 912.00 = 786.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 912.00 TO NODE 913.00 IS CODE = 51

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

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 525.00 DOWNSTREAM(FEET) = 470.00  
CHANNEL LENGTH THRU SUBAREA(FEET) = 618.00 CHANNEL SLOPE = 0.0890  
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.190

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.10	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	4.60	0.25	1.000	75
NATURAL FAIR COVER					
"OPEN BRUSH"	C	4.00	0.25	1.000	77
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	0.60	0.25	1.000	77
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	2.70	0.20	1.000	81
NATURAL FAIR COVER					
"OPEN BRUSH"	D	5.10	0.20	1.000	83

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.23

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 41.67

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.10

AVERAGE FLOW DEPTH(FEET) = 1.31 TRAVEL TIME(MIN.) = 1.27

Tc(MIN.) = 10.38

SUBAREA AREA(ACRES) = 17.10 SUBAREA RUNOFF(CFS) = 45.60

EFFECTIVE AREA(ACRES) = 23.60 AREA-AVERAGED Fm(INCH/HR) = 0.22

AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 23.6 PEAK FLOW RATE(CFS) = 63.01

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.53 FLOW VELOCITY(FEET/SEC.) = 8.97

LONGEST FLOWPATH FROM NODE 910.00 TO NODE 913.00 = 1404.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 913.00 TO NODE 902.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 470.00 DOWNSTREAM(FEET) = 459.00

FLOW LENGTH(FEET) = 890.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 11.26

ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 63.01

PIPE TRAVEL TIME(MIN.) = 1.32 Tc(MIN.) = 11.70

LONGEST FLOWPATH FROM NODE 910.00 TO NODE 902.00 = 2294.00 FEET.

\*\*\*\*\*  
FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2

OF-3

OF-2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 11.70
RAINFALL INTENSITY (INCH/HR) = 2.98
AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 23.60
TOTAL STREAM AREA(ACRES) = 23.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 63.01

\*\* CONFLUENCE DATA \*\*

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1 and 2.

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

\*\* PEAK FLOW RATE TABLE \*\*

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1 and 2.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 65.39 Tc(MIN.) = 11.70
EFFECTIVE AREA(ACRES) = 24.45 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 24.8
LONGEST FLOWPATH FROM NODE 910.00 TO NODE 902.00 = 2294.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 11.70
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.982
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCs SOIL AREA Fp Ap SCs
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 0.20 0.30 1.000 63
COMMERCIAL B 5.50 0.30 0.100 56
NATURAL FAIR COVER
"OPEN BRUSH" B 0.20 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" C 0.10 0.25 1.000 75
COMMERCIAL C 1.00 0.25 0.100 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.175
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 18.73
EFFECTIVE AREA(ACRES) = 31.55 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.81
TOTAL AREA(ACRES) = 31.9 PEAK FLOW RATE(CFS) = 79.43

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FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 11.70
\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.982
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCs SOIL AREA Fp Ap SCs
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH" C 0.20 0.25 1.000 77
RESIDENTIAL
".4 DWELLING/ACRE" C 0.10 0.25 0.900 69
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" D 3.20 0.20 1.000 81
COMMERCIAL D 3.40 0.20 0.100 75
NATURAL FAIR COVER
"OPEN BRUSH" D 3.30 0.20 1.000 83
RESIDENTIAL
".4 DWELLING/ACRE" D 0.70 0.20 0.900 75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.712
SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 27.84
EFFECTIVE AREA(ACRES) = 42.45 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.79
TOTAL AREA(ACRES) = 42.8 PEAK FLOW RATE(CFS) = 107.27

F-2

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FLOW PROCESS FROM NODE 902.00 TO NODE 903.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 459.00 DOWNSTREAM(FEET) = 426.00
FLOW LENGTH(FEET) = 654.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.60
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 107.27
PIPE TRAVEL TIME(MIN.) = 0.50 Tc(MIN.) = 12.20
LONGEST FLOWPATH FROM NODE 910.00 TO NODE 903.00 = 2948.00 FEET.

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FLOW PROCESS FROM NODE 903.00 TO NODE 903.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 12.20
RAINFALL INTENSITY (INCH/HR) = 2.91
AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.79
EFFECTIVE STREAM AREA(ACRES) = 42.45
TOTAL STREAM AREA(ACRES) = 42.80

PEAK FLOW RATE(CFS) AT CONFLUENCE = 107.27

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FLOW PROCESS FROM NODE 920.00 TO NODE 921.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 286.00
ELEVATION DATA: UPSTREAM(FEET) = 860.00 DOWNSTREAM(FEET) = 712.00

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.737
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.768
SUBAREA Tc AND LOSS RATE DATA(AMC II):

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Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include NATURAL FAIR COVER, OPEN BRUSH, and SUBAREA AVERAGE PERVIOUS LOSS RATE.

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FLOW PROCESS FROM NODE 921.00 TO NODE 922.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 712.00 DOWNSTREAM(FEET) = 600.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 594.00 CHANNEL SLOPE = 0.1886
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.502

OF-5

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include WOODLAND,GRASS, CHAPARRAL,BROADLEAF, OPEN BRUSH, and SUBAREA AVERAGE PERVIOUS LOSS RATE.

AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 43.27

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.15 FLOW VELOCITY(FEET/SEC.) = 10.81
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 922.00 = 880.00 FEET.

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FLOW PROCESS FROM NODE 922.00 TO NODE 923.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 600.00 DOWNSTREAM(FEET) = 550.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 604.00 CHANNEL SLOPE = 0.0828
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.258

OF-6

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include CHAPARRAL,BROADLEAF, WOODLAND,GRASS, OPEN BRUSH, and SUBAREA AVERAGE PERVIOUS LOSS RATE.

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.53 FLOW VELOCITY(FEET/SEC.) = 8.64
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 923.00 = 1484.00 FEET.

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FLOW PROCESS FROM NODE 923.00 TO NODE 924.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 550.00 DOWNSTREAM(FEET) = 495.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 849.00 CHANNEL SLOPE = 0.0648
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.984

OF-7

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include WOODLAND,GRASS.

NATURAL FAIR COVER  
 "WOODLAND,GRASS" C 0.80 0.25 1.000 77  
 NATURAL FAIR COVER  
 "OPEN BRUSH" B 0.80 0.30 1.000 66  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" B 1.10 0.30 1.000 63  
 NATURAL FAIR COVER  
 "WOODLAND,GRASS" D 5.20 0.20 1.000 82  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" C 6.30 0.25 1.000 75  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 78.97  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.43  
 AVERAGE FLOW DEPTH(FEET) = 1.77 TRAVEL TIME(MIN.) = 1.68  
 Tc(MIN.) = 11.68  
 SUBAREA AREA(ACRES) = 14.80 SUBAREA RUNOFF(CFS) = 36.54  
 EFFECTIVE AREA(ACRES) = 36.90 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 36.9 PEAK FLOW RATE(CFS) = 91.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 1.87 FLOW VELOCITY(FEET/SEC.) = 8.73  
 LONGEST FLOWPATH FROM NODE 920.00 TO NODE 924.00 = 2333.00 FEET.

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 FLOW PROCESS FROM NODE 924.00 TO NODE 924.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 11.68  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.984  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 NATURAL FAIR COVER  
 "OPEN BRUSH" C 9.70 0.25 1.000 77  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" D 17.00 0.20 1.000 81  
 NATURAL FAIR COVER  
 "OPEN BRUSH" D 36.60 0.20 1.000 83  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.21  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 63.30 SUBAREA RUNOFF(CFS) = 158.16  
 EFFECTIVE AREA(ACRES) = 100.20 AREA-AVERAGED Fm(INCH/HR) = 0.21  
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 100.2 PEAK FLOW RATE(CFS) = 249.94

OF-7

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 FLOW PROCESS FROM NODE 924.00 TO NODE 925.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 495.00 DOWNSTREAM(FEET) = 457.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 607.00 CHANNEL SLOPE = 0.0626  
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00

\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.860  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" B 0.10 0.30 1.000 63  
 NATURAL FAIR COVER  
 "WOODLAND,GRASS" B 0.30 0.30 1.000 65  
 NATURAL FAIR COVER  
 "GRASS" C 0.60 0.25 1.000 79  
 NATURAL FAIR COVER  
 "OPEN BRUSH" B 0.70 0.30 1.000 66  
 NATURAL FAIR COVER  
 "WOODLAND,GRASS" D 0.90 0.20 1.000 82  
 NATURAL FAIR COVER  
 "GRASS" B 0.90 0.30 1.000 69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 254.03  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.12  
 AVERAGE FLOW DEPTH(FEET) = 2.76 TRAVEL TIME(MIN.) = 0.91  
 Tc(MIN.) = 12.59  
 SUBAREA AREA(ACRES) = 3.50 SUBAREA RUNOFF(CFS) = 8.17  
 EFFECTIVE AREA(ACRES) = 103.70 AREA-AVERAGED Fm(INCH/HR) = 0.21  
 AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 103.7 PEAK FLOW RATE(CFS) = 249.94  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 2.74 FLOW VELOCITY(FEET/SEC.) = 11.08  
 LONGEST FLOWPATH FROM NODE 920.00 TO NODE 925.00 = 2940.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 925.00 TO NODE 925.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 12.59  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.860  
 SUBAREA LOSS RATE DATA(AMC II):  
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS  
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN  
 NATURAL FAIR COVER  
 "OPEN BRUSH" D 3.80 0.20 1.000 83  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" D 4.20 0.20 1.000 81  
 NATURAL FAIR COVER  
 "WOODLAND,GRASS" C 5.10 0.25 1.000 77  
 NATURAL FAIR COVER  
 "OPEN BRUSH" C 7.00 0.25 1.000 77  
 NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" C 12.00 0.25 1.000 75  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 32.10 SUBAREA RUNOFF(CFS) = 75.76  
 EFFECTIVE AREA(ACRES) = 135.80 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 135.8 PEAK FLOW RATE(CFS) = 322.70

OF-8

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FLOW PROCESS FROM NODE 925.00 TO NODE 926.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 457.00 DOWNSTREAM(FEET) = 440.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 884.00 CHANNEL SLOPE = 0.0192
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.639
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"GRASS"            D         0.50   0.20   1.000  84
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B        0.70   0.30   1.000  63
NATURAL FAIR COVER
"WOODLAND,GRASS"  C         2.30   0.25   1.000  77
NATURAL FAIR COVER
"OPEN BRUSH"      B         2.40   0.30   1.000  66
NATURAL FAIR COVER
"GRASS"           B         2.50   0.30   1.000  69
NATURAL FAIR COVER
"GRASS"           C         3.20   0.25   1.000  79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 335.05
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.66
AVERAGE FLOW DEPTH(FEET) = 3.82 TRAVEL TIME(MIN.) = 1.92
Tc(MIN.) = 14.52
SUBAREA AREA(ACRES) = 11.60 SUBAREA RUNOFF(CFS) = 24.71
EFFECTIVE AREA(ACRES) = 147.40 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 147.4 PEAK FLOW RATE(CFS) = 322.70
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 3.77 FLOW VELOCITY(FEET/SEC.) = 7.58
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 926.00 = 3824.00 FEET.
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*****
FLOW PROCESS FROM NODE 926.00 TO NODE 926.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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-----
MAINLINE Tc(MIN.) = 14.52
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.639
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"WOODLAND,GRASS"  D         7.40   0.20   1.000  82
NATURAL FAIR COVER
"OPEN BRUSH"      C        12.40   0.25   1.000  77
NATURAL FAIR COVER
```

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```
"OPEN BRUSH"      D         28.20   0.20   1.000  83
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" D        31.40   0.20   1.000  81
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" C         42.40   0.25   1.000  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 121.80 SUBAREA RUNOFF(CFS) = 264.86
EFFECTIVE AREA(ACRES) = 269.20 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 269.2 PEAK FLOW RATE(CFS) = 585.23
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*****
FLOW PROCESS FROM NODE 926.00 TO NODE 903.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
```

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-----
ELEVATION DATA: UPSTREAM(FEET) = 440.00 DOWNSTREAM(FEET) = 426.00
FLOW LENGTH(FEET) = 1341.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 84.0 INCH PIPE IS 65.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.30
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 585.23
PIPE TRAVEL TIME(MIN.) = 1.22 Tc(MIN.) = 15.74
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 903.00 = 5165.00 FEET.
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*****
FLOW PROCESS FROM NODE 903.00 TO NODE 903.00 IS CODE = 1
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```
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
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-----
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.74
RAINFALL INTENSITY(INCH/HR) = 2.52
AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.22
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 269.20
TOTAL STREAM AREA(ACRES) = 269.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 585.23
```

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*****
FLOW PROCESS FROM NODE 930.00 TO NODE 931.00 IS CODE = 21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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-----
INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 715.00 DOWNSTREAM(FEET) = 517.00
```

```
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.954
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.709
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS   Tc
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
```

OF-10

NATURAL FAIR COVER  
 "CHAPARRAL,BROADLEAF" C 0.60 0.25 1.000 75 7.95  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA RUNOFF(CFS) = 1.87  
 TOTAL AREA (ACRES) = 0.60 PEAK FLOW RATE (CFS) = 1.87

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 931.00 TO NODE 932.00 IS CODE = 51  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 517.00 DOWNSTREAM(FEET) = 430.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 443.00 CHANNEL SLOPE = 0.1964  
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.472

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SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.10	0.25	0.900	69
COMMERCIAL	C	0.40	0.25	0.100	69
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	0.30	0.25	1.000	77
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	4.30	0.25	1.000	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.927  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.31  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.49  
 AVERAGE FLOW DEPTH(FEET) = 0.64 TRAVEL TIME(MIN.) = 0.99  
 Tc(MIN.) = 8.94  
 SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 14.87  
 EFFECTIVE AREA(ACRES) = 5.70 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.94  
 TOTAL AREA(ACRES) = 5.7 PEAK FLOW RATE(CFS) = 16.61

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.80 FLOW VELOCITY(FEET/SEC.) = 8.69  
 LONGEST FLOWPATH FROM NODE 930.00 TO NODE 932.00 = 773.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 932.00 TO NODE 903.00 IS CODE = 31  
 -----

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 430.00 DOWNSTREAM(FEET) = 426.00  
 FLOW LENGTH(FEET) = 254.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.3 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.85  
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 16.61  
 PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 9.42  
 LONGEST FLOWPATH FROM NODE 930.00 TO NODE 903.00 = 1027.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 903.00 TO NODE 903.00 IS CODE = 1  
 -----

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

=====

TOTAL NUMBER OF STREAMS = 3  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:  
 TIME OF CONCENTRATION(MIN.) = 9.42  
 RAINFALL INTENSITY(INCH/HR) = 3.37  
 AREA-AVERAGED Fm(INCH/HR) = 0.23  
 AREA-AVERAGED Fp(INCH/HR) = 0.25  
 AREA-AVERAGED Ap = 0.94  
 EFFECTIVE STREAM AREA(ACRES) = 5.70  
 TOTAL STREAM AREA(ACRES) = 5.70  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.61

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	107.27	12.20	2.911	0.22( 0.17)	0.79	42.4	910.00
1	87.74	17.05	2.409	0.22( 0.17)	0.79	42.8	900.00
2	585.23	15.74	2.521	0.22( 0.22)	1.00	269.2	920.00
3	16.61	9.42	3.371	0.25( 0.23)	0.94	5.7	930.00

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

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	593.11	9.42	3.371	0.22( 0.22)	0.96	199.6	930.00
2	652.34	12.20	2.911	0.22( 0.22)	0.96	256.9	910.00
3	690.37	15.74	2.521	0.22( 0.22)	0.97	317.6	920.00
4	656.06	17.05	2.409	0.22( 0.22)	0.97	317.7	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 690.37 Tc(MIN.) = 15.74  
 EFFECTIVE AREA(ACRES) = 317.61 AREA-AVERAGED Fm(INCH/HR) = 0.22  
 AREA-AVERAGED Fp(INCH/HR) = 0.22 AREA-AVERAGED Ap = 0.97  
 TOTAL AREA(ACRES) = 317.7  
 LONGEST FLOWPATH FROM NODE 920.00 TO NODE 903.00 = 5165.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 903.00 TO NODE 903.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 15.74  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.521

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SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
".4 DWELLING/ACRE"	C	0.50	0.25	0.900	69
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.10	0.30	0.900	56
RESIDENTIAL					

```

".4 DWELLING/ACRE"      D      3.00   0.20   0.900   75
COMMERCIAL              D      5.90   0.20   0.100   75
COMMERCIAL              C      7.70   0.25   0.100   69
COMMERCIAL              B     13.60   0.30   0.100   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.237
SUBAREA AREA (ACRES) = 32.80   SUBAREA RUNOFF (CFS) = 72.67
EFFECTIVE AREA (ACRES) = 350.41   AREA-AVERAGED Fm (INCH/HR) = 0.20
AREA-AVERAGED Fp (INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.90
TOTAL AREA (ACRES) = 350.5   PEAK FLOW RATE (CFS) = 731.27

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*****
FLOW PROCESS FROM NODE 903.00 TO NODE 904.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 426.00   DOWNSTREAM(FEET) = 370.00
FLOW LENGTH(FEET) = 896.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 49.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 38.03
ESTIMATED PIPE DIAMETER (INCH) = 66.00   NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 731.27
PIPE TRAVEL TIME (MIN.) = 0.39   Tc (MIN.) = 16.13
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 904.00 = 6061.00 FEET.

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*****
FLOW PROCESS FROM NODE 904.00 TO NODE 904.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc (MIN.) = 16.13
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.486
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B      3.80   0.30  0.100  56
COMMERCIAL          C      0.60   0.25  0.100  69
NATURAL FAIR COVER
"GRASS"             B      0.10   0.30  1.000  69
RESIDENTIAL
".4 DWELLING/ACRE" B      2.40   0.30  0.900  56
RESIDENTIAL
".4 DWELLING/ACRE" C      2.20   0.25  0.900  69
RESIDENTIAL
".4 DWELLING/ACRE" D      0.30   0.20  0.900  75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.27
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA (ACRES) = 9.40   SUBAREA RUNOFF (CFS) = 19.81
EFFECTIVE AREA (ACRES) = 359.81   AREA-AVERAGED Fm (INCH/HR) = 0.20
AREA-AVERAGED Fp (INCH/HR) = 0.22   AREA-AVERAGED Ap = 0.89
TOTAL AREA (ACRES) = 359.9   PEAK FLOW RATE (CFS) = 740.06

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*****
FLOW PROCESS FROM NODE 904.00 TO NODE 905.00 IS CODE = 31
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>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 370.00   DOWNSTREAM(FEET) = 330.00
FLOW LENGTH(FEET) = 872.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 54.4 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 33.69
ESTIMATED PIPE DIAMETER (INCH) = 69.00   NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 740.06
PIPE TRAVEL TIME (MIN.) = 0.43   Tc (MIN.) = 16.56
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 905.00 = 6933.00 FEET.

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*****
FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 1
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>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
-----
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 16.56
RAINFALL INTENSITY (INCH/HR) = 2.45
AREA-AVERAGED Fm (INCH/HR) = 0.20
AREA-AVERAGED Fp (INCH/HR) = 0.22
AREA-AVERAGED Ap = 0.89
EFFECTIVE STREAM AREA (ACRES) = 359.81
TOTAL STREAM AREA (ACRES) = 359.90
PEAK FLOW RATE (CFS) AT CONFLUENCE = 740.06

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*****
FLOW PROCESS FROM NODE 940.00 TO NODE 941.00 IS CODE = 21
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>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----

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INITIAL SUBAREA FLOW-LENGTH (FEET) = 304.00
ELEVATION DATA: UPSTREAM(FEET) = 858.00   DOWNSTREAM(FEET) = 675.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 7.692
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.780
SUBAREA Tc AND LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS   Tc
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL FAIR COVER
"CHAPARRAL, BROADLEAF" C      0.10   0.25  1.000  75  7.69
NATURAL FAIR COVER
"OPEN BRUSH"         C      1.10   0.25  1.000  77  7.69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 3.81
TOTAL AREA (ACRES) = 1.20   PEAK FLOW RATE (CFS) = 3.81

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**OF-13**

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*****
FLOW PROCESS FROM NODE 941.00 TO NODE 942.00 IS CODE = 51
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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 675.00   DOWNSTREAM(FEET) = 405.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 1008.00   CHANNEL SLOPE = 0.2679

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CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.414 **OF-14**  
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "GRASS"	B	0.10	0.30	1.000	69
NATURAL FAIR COVER "WOODLAND, GRASS"	B	0.80	0.30	1.000	65
NATURAL FAIR COVER "OPEN BRUSH"	B	1.10	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND, GRASS"	C	1.50	0.25	1.000	77
NATURAL FAIR COVER "CHAPARRAL, BROADLEAF"	C	3.60	0.25	1.000	75
NATURAL FAIR COVER "OPEN BRUSH"	C	10.20	0.25	1.000	77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.26  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 28.46  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 11.06  
 AVERAGE FLOW DEPTH (FEET) = 0.93 TRAVEL TIME (MIN.) = 1.52  
 Tc (MIN.) = 9.21  
 SUBAREA AREA (ACRES) = 17.30 SUBAREA RUNOFF (CFS) = 49.17  
 EFFECTIVE AREA (ACRES) = 18.50 AREA-AVERAGED Fm (INCH/HR) = 0.26  
 AREA-AVERAGED Fp (INCH/HR) = 0.26 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA (ACRES) = 18.5 PEAK FLOW RATE (CFS) = 52.58

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH (FEET) = 1.16 FLOW VELOCITY (FEET/SEC.) = 12.93  
 LONGEST FLOWPATH FROM NODE 940.00 TO NODE 942.00 = 1312.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 942.00 TO NODE 905.00 IS CODE = 31  
 -----

>>>> COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>> USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM (FEET) = 405.00 DOWNSTREAM (FEET) = 330.00  
 FLOW LENGTH (FEET) = 1041.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.0 INCHES  
 PIPE-FLOW VELOCITY (FEET/SEC.) = 20.79  
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1  
 PIPE-FLOW (CFS) = 52.58  
 PIPE TRAVEL TIME (MIN.) = 0.83 Tc (MIN.) = 10.05  
 LONGEST FLOWPATH FROM NODE 940.00 TO NODE 905.00 = 2353.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 1  
 -----

>>>> DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 -----  
 TOTAL NUMBER OF STREAMS = 3  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION (MIN.) = 10.05  
 RAINFALL INTENSITY (INCH/HR) = 3.25  
 AREA-AVERAGED Fm (INCH/HR) = 0.26

AREA-AVERAGED Fp (INCH/HR) = 0.26  
 AREA-AVERAGED Ap = 1.00  
 EFFECTIVE STREAM AREA (ACRES) = 18.50  
 TOTAL STREAM AREA (ACRES) = 18.50  
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 52.58

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 950.00 TO NODE 951.00 IS CODE = 21  
 -----

>>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 >> USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<<  
 -----  
 INITIAL SUBAREA FLOW-LENGTH (FEET) = 328.00  
 ELEVATION DATA: UPSTREAM (FEET) = 1053.00 DOWNSTREAM (FEET) = 990.00

Tc = K \* [(LENGTH \*\* 3.00) / (ELEVATION CHANGE)] \*\* 0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.965 **OF-15**  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.265  
 SUBAREA Tc AND LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "OPEN BRUSH"	C	0.40	0.25	1.000	77	9.96
NATURAL FAIR COVER "OPEN BRUSH"	D	1.00	0.20	1.000	83	9.96

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.21  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA RUNOFF (CFS) = 3.84  
 TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 3.84

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 951.00 TO NODE 952.00 IS CODE = 51  
 -----

>>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<  
 >>>> TRAVEL TIME THRU SUBAREA (EXISTING ELEMENT)<<<<<  
 -----  
 ELEVATION DATA: UPSTREAM (FEET) = 990.00 DOWNSTREAM (FEET) = 950.00  
 CHANNEL LENGTH THRU SUBAREA (FEET) = 439.00 CHANNEL SLOPE = 0.0911  
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000

MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00 **OF-16**  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.023  
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	D	0.10	0.20	1.000	83
NATURAL FAIR COVER "OPEN BRUSH"	C	0.40	0.25	1.000	77
NATURAL FAIR COVER "GRASS"	C	0.60	0.25	1.000	79
NATURAL FAIR COVER "GRASS"	D	0.70	0.20	1.000	84

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.23  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 6.11  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.03  
 AVERAGE FLOW DEPTH (FEET) = 0.64 TRAVEL TIME (MIN.) = 1.45  
 Tc (MIN.) = 11.42

SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 4.53  
 EFFECTIVE AREA (ACRES) = 3.20 AREA-AVERAGED Fm (INCH/HR) = 0.22  
 AREA-AVERAGED Fp (INCH/HR) = 0.22 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA (ACRES) = 3.2 PEAK FLOW RATE (CFS) = 8.07

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH (FEET) = 0.70 FLOW VELOCITY (FEET/SEC.) = 5.41  
 LONGEST FLOWPATH FROM NODE 950.00 TO NODE 952.00 = 767.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 952.00 TO NODE 953.00 IS CODE = 51  
 -----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 950.00 DOWNSTREAM (FEET) = 675.00  
 CHANNEL LENGTH THRU SUBAREA (FEET) = 810.00 CHANNEL SLOPE = 0.3395  
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.863

OF-17

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	D	0.60	0.20	1.000	81
NATURAL FAIR COVER					
"GRASS"	D	1.50	0.20	1.000	84
NATURAL FAIR COVER					
"GRASS"	C	1.70	0.25	1.000	79
NATURAL FAIR COVER					
"OPEN BRUSH"	C	3.40	0.25	1.000	77
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	C	7.20	0.25	1.000	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 25.06  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 11.73  
 AVERAGE FLOW DEPTH (FEET) = 0.84 TRAVEL TIME (MIN.) = 1.15  
 Tc (MIN.) = 12.57  
 SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 33.96  
 EFFECTIVE AREA (ACRES) = 17.60 AREA-AVERAGED Fm (INCH/HR) = 0.24  
 AREA-AVERAGED Fp (INCH/HR) = 0.24 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA (ACRES) = 17.6 PEAK FLOW RATE (CFS) = 41.56

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH (FEET) = 1.02 FLOW VELOCITY (FEET/SEC.) = 13.33  
 LONGEST FLOWPATH FROM NODE 950.00 TO NODE 953.00 = 1577.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 953.00 TO NODE 954.00 IS CODE = 51  
 -----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 675.00 DOWNSTREAM (FEET) = 475.00  
 CHANNEL LENGTH THRU SUBAREA (FEET) = 955.00 CHANNEL SLOPE = 0.2094  
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00

\* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.713 OF-18

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"GRASS"	D	0.10	0.20	1.000	84
NATURAL FAIR COVER					
"OPEN BRUSH"	D	0.10	0.20	1.000	83
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	66
NATURAL FAIR COVER					
"GRASS"	C	2.10	0.25	1.000	79
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	C	8.90	0.25	1.000	75
NATURAL FAIR COVER					
"OPEN BRUSH"	C	14.80	0.25	1.000	77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 71.05  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 12.75  
 AVERAGE FLOW DEPTH (FEET) = 1.36 TRAVEL TIME (MIN.) = 1.25  
 Tc (MIN.) = 13.82  
 SUBAREA AREA (ACRES) = 26.60 SUBAREA RUNOFF (CFS) = 58.96  
 EFFECTIVE AREA (ACRES) = 44.20 AREA-AVERAGED Fm (INCH/HR) = 0.25  
 AREA-AVERAGED Fp (INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA (ACRES) = 44.2 PEAK FLOW RATE (CFS) = 98.15

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH (FEET) = 1.54 FLOW VELOCITY (FEET/SEC.) = 13.83  
 LONGEST FLOWPATH FROM NODE 950.00 TO NODE 954.00 = 2532.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 954.00 TO NODE 955.00 IS CODE = 51  
 -----

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 475.00 DOWNSTREAM (FEET) = 410.00  
 CHANNEL LENGTH THRU SUBAREA (FEET) = 814.00 CHANNEL SLOPE = 0.0799  
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00  
 \* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.574

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SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"GRASS"	B	0.10	0.30	1.000	69
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	D	0.40	0.20	1.000	81
NATURAL FAIR COVER					
"OPEN BRUSH"	D	0.40	0.20	1.000	83
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.90	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	C	5.20	0.25	1.000	77
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	C	9.50	0.25	1.000	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.26

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 117.45  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.06  
 AVERAGE FLOW DEPTH(FEET) = 1.97 TRAVEL TIME(MIN.) = 1.35  
 Tc(MIN.) = 15.17  
 SUBAREA AREA(ACRES) = 18.50 SUBAREA RUNOFF(CFS) = 38.60  
 EFFECTIVE AREA(ACRES) = 62.70 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 62.7 PEAK FLOW RATE(CFS) = 131.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 2.06 FLOW VELOCITY(FEET/SEC.) = 10.34  
 LONGEST FLOWPATH FROM NODE 950.00 TO NODE 955.00 = 3346.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 955.00 TO NODE 956.00 IS CODE = 51  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 410.00 DOWNSTREAM(FEET) = 375.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 643.00 CHANNEL SLOPE = 0.0544  
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000  
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.469

OF-20

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	0.20	0.30	1.000	63
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.50	0.30	1.000	65
NATURAL FAIR COVER					
"GRASS"	C	1.20	0.25	1.000	79
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	3.60	0.25	1.000	77
NATURAL FAIR COVER					
"GRASS"	B	3.80	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	6.10	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.28  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 146.34  
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.21  
 AVERAGE FLOW DEPTH(FEET) = 2.30 TRAVEL TIME(MIN.) = 1.16  
 Tc(MIN.) = 16.33  
 SUBAREA AREA(ACRES) = 15.40 SUBAREA RUNOFF(CFS) = 30.27  
 EFFECTIVE AREA(ACRES) = 78.10 AREA-AVERAGED Fm(INCH/HR) = 0.26  
 AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 78.1 PEAK FLOW RATE(CFS) = 155.52

END OF SUBAREA CHANNEL FLOW HYDRAULICS:  
 DEPTH(FEET) = 2.35 FLOW VELOCITY(FEET/SEC.) = 9.35  
 LONGEST FLOWPATH FROM NODE 950.00 TO NODE 956.00 = 3989.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 956.00 TO NODE 956.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
 =====  
 MAINLINE Tc(MIN.) = 16.33  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.469

OF-20

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	14.30	0.25	1.000	75
NATURAL FAIR COVER					
"OPEN BRUSH"	C	21.60	0.25	1.000	77

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.25  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 35.90 SUBAREA RUNOFF(CFS) = 71.68  
 EFFECTIVE AREA(ACRES) = 114.00 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 114.0 PEAK FLOW RATE(CFS) = 227.20

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 956.00 TO NODE 956.00 IS CODE = 81  
 -----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.33  
 \* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.469

OF-21

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	D	0.30	0.20	1.000	83
NATURAL FAIR COVER					
"OPEN BRUSH"	C	0.30	0.25	1.000	77
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	D	0.60	0.20	1.000	81
NATURAL FAIR COVER					
"WOODLAND,GRASS"	C	2.30	0.25	1.000	77
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	C	3.20	0.25	1.000	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.24  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 13.42  
 EFFECTIVE AREA(ACRES) = 120.70 AREA-AVERAGED Fm(INCH/HR) = 0.25  
 AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 1.00  
 TOTAL AREA(ACRES) = 120.7 PEAK FLOW RATE(CFS) = 240.62

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 956.00 TO NODE 905.00 IS CODE = 31  
 -----

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

ELEVATION DATA: UPSTREAM(FEET) = 375.00 DOWNSTREAM(FEET) = 330.00  
 FLOW LENGTH(FEET) = 1304.00 MANNING'S N = 0.013  
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.92  
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 240.62  
 PIPE TRAVEL TIME(MIN.) = 0.95 Tc(MIN.) = 17.28

LONGEST FLOWPATH FROM NODE 950.00 TO NODE 905.00 = 5293.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 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.) = 17.28
RAINFALL INTENSITY(INCH/HR) = 2.39
AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.25
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 120.70
TOTAL STREAM AREA(ACRES) = 120.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 240.62

\*\* CONFLUENCE DATA \*\*

Table with 9 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-3.

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

\*\* PEAK FLOW RATE TABLE \*\*

Table with 9 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-6.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1015.48 Tc(MIN.) = 16.56
EFFECTIVE AREA(ACRES) = 494.00 AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.23 AREA-AVERAGED Ap = 0.92
TOTAL AREA(ACRES) = 499.1
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 905.00 = 6933.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.56
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.449
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

Table with 6 columns: LAND USE, GROUP, (ACRES), (INCH/HR), (DECIMAL), CN. Rows for COMMERCIAL, RESIDENTIAL, SUBAREA AVERAGE PVIOUS LOSS RATE, etc.

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\*\*\*\*\*

FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.56
\* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.449
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 8.00 0.40 0.100 32
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 17.34
EFFECTIVE AREA(ACRES) = 548.70 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 553.8 PEAK FLOW RATE(CFS) = 1110.83

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END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 553.8 TC(MIN.) = 16.56
EFFECTIVE AREA(ACRES) = 548.70 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.848
PEAK FLOW RATE(CFS) = 1110.83

\*\* PEAK FLOW RATE TABLE \*\*

Table with 9 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp(Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Rows 1-6.

END OF RATIONAL METHOD ANALYSIS

