

THE RANCH PLAN PLANNED COMMUNITY
PLANNING AREAS 3 AND 4 RUNOFF MANAGEMENT PLAN

Michael Baker
INTERNATIONAL

TECHNICAL APPENDIX B.2

**Rational Method Expected Value
(2-, 5-, 10-, 25-, 50- and 100-year)**

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 SUBAREA A ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 2-YR EV AUGUST 2018 CCHIU *

FILE NAME: PA3A02EV.DAT
TIME/DATE OF STUDY: 12:06 08/15/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 1.600
- 2) 10.00; 1.060
- 3) 15.00; 0.840
- 4) 20.00; 0.720
- 5) 25.00; 0.630
- 6) 30.00; 0.560
- 7) 40.00; 0.480
- 8) 50.00; 0.420
- 9) 60.00; 0.366
- 10) 90.00; 0.300
- 11) 120.00; 0.246
- 12) 180.00; 0.190
- 13) 360.00; 0.136
- 14) 1200.00; 0.080

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 100.00 TO NODE 101.00 IS CODE = 21

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

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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
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.123
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"	-	1.10	0.60	1.000	0	9.41

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.52
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 0.52

OA-1

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

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

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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
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.005

OA-2

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.90	0.60	1.000	-
USER-DEFINED	-	2.60	0.60	1.000	-
USER-DEFINED	-	0.70	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.983
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.31
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.49
AVERAGE FLOW DEPTH(FEET) = 0.35 TRAVEL TIME(MIN.) = 1.84
Tc(MIN.) = 11.25
SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 1.57
EFFECTIVE AREA(ACRES) = 5.30 AREA-AVERAGED Fm(INCH/HR) = 0.59
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.99
TOTAL AREA(ACRES) = 5.3 PEAK FLOW RATE(CFS) = 1.97

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.41 FLOW VELOCITY(FEET/SEC.) = 3.92
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)<<<<<

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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) = 2.60
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.20
HALFSTREET FLOOD WIDTH(FEET) = 2.00
AVERAGE FLOW VELOCITY(FEET/SEC.) = 6.12
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.21
STREET FLOW TRAVEL TIME(MIN.) = 0.72 Tc(MIN.) = 11.97

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.973

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.10	0.60	0.900	-
USER-DEFINED	-	1.00	0.60	0.100	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.519
SUBAREA AREA(ACRES) = 2.10 SUBAREA RUNOFF(CFS) = 1.25
EFFECTIVE AREA(ACRES) = 7.40 AREA-AVERAGED Fm(INCH/HR) = 0.51
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 7.4 PEAK FLOW RATE(CFS) = 3.07

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.22 HALFSTREET FLOOD WIDTH(FEET) = 3.34
FLOW VELOCITY(FEET/SEC.) = 5.23 DEPTH*VELOCITY(FT*FT/SEC.) = 1.16
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) = 6.24

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 8.03
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.05
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.24
STREET FLOW TRAVEL TIME(MIN.) = 2.03 Tc(MIN.) = 14.00

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.884

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.10	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	0.900	-
USER-DEFINED	-	6.60	0.60	0.100	-
USER-DEFINED	-	1.80	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.271

SUBAREA AREA(ACRES) = 9.80 SUBAREA RUNOFF(CFS) = 6.36
EFFECTIVE AREA(ACRES) = 17.20 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 8.83

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 9.59
FLOW VELOCITY(FEET/SEC.) = 4.35 DEPTH*VELOCITY(FT*FT/SEC.) = 1.45
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)<<<<<

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

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

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 9.85

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

PIPE-FLOW(CFS) = 8.83

PIPE TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 16.47

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<<<<<

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MAINLINE Tc(MIN.) = 16.47

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.805

A-3

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.60	0.100	-
USER-DEFINED	-	3.90	0.60	0.100	-
USER-DEFINED	-	0.20	0.60	0.850	-
USER-DEFINED	-	0.90	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.255
 SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 3.28
 EFFECTIVE AREA(ACRES) = 22.80 AREA-AVERAGED Fm(INCH/HR) = 0.27
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 22.8 PEAK FLOW RATE(CFS) = 10.89

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

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

 MAINLINE Tc(MIN.) = 16.47
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.805
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	0.850	-
USER-DEFINED	-	0.40	0.60	0.900	-
USER-DEFINED	-	5.00	0.60	0.100	-
USER-DEFINED	-	2.10	0.60	0.850	-
USER-DEFINED	-	0.80	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
 SUBAREA AREA(ACRES) = 9.20 SUBAREA RUNOFF(CFS) = 4.68
 EFFECTIVE AREA(ACRES) = 32.00 AREA-AVERAGED Fm(INCH/HR) = 0.26
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.44
 TOTAL AREA(ACRES) = 32.0 PEAK FLOW RATE(CFS) = 15.57

A-4

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

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

 MAINLINE Tc(MIN.) = 16.47
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.805
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.80	0.60	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 1.21
 EFFECTIVE AREA(ACRES) = 33.80 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 33.8 PEAK FLOW RATE(CFS) = 16.78

A-4

 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 21.0 INCH PIPE IS 13.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.02
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 16.78
 PIPE TRAVEL TIME(MIN.) = 1.34 Tc(MIN.) = 17.80
 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.) = 17.80
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.773
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.80	0.60	0.100	-
USER-DEFINED	-	7.60	0.60	0.100	-
USER-DEFINED	-	0.40	0.60	0.850	-
USER-DEFINED	-	10.50	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.125
 SUBAREA AREA(ACRES) = 21.60 SUBAREA RUNOFF(CFS) = 13.56
 EFFECTIVE AREA(ACRES) = 55.40 AREA-AVERAGED Fm(INCH/HR) = 0.18
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.31
 TOTAL AREA(ACRES) = 55.4 PEAK FLOW RATE(CFS) = 29.37

A-5

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

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

 MAINLINE Tc(MIN.) = 17.80
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.773
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	6.80	0.60	0.100	-
USER-DEFINED	-	12.10	0.60	0.100	-
USER-DEFINED	-	1.00	0.60	0.850	-
USER-DEFINED	-	4.50	0.60	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.131
 SUBAREA AREA(ACRES) = 24.40 SUBAREA RUNOFF(CFS) = 15.25
 EFFECTIVE AREA(ACRES) = 79.80 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.25
 TOTAL AREA(ACRES) = 79.8 PEAK FLOW RATE(CFS) = 44.61

A-6

 FLOW PROCESS FROM NODE 106.00 TO NODE 107.00 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) = 503.00 DOWNSTREAM(FEET) = 485.00
FLOW LENGTH(FEET) = 808.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.05
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 44.61
PIPE TRAVEL TIME(MIN.) = 1.03 Tc(MIN.) = 18.84
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
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 18.84
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.748
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 3.40 0.60 0.100 -
USER-DEFINED - 6.70 0.60 0.100 -
USER-DEFINED - 0.10 0.60 0.850 -
USER-DEFINED - 2.50 0.60 0.100 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.106
SUBAREA AREA(ACRES) = 12.70 SUBAREA RUNOFF(CFS) = 7.82
EFFECTIVE AREA(ACRES) = 92.50 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.23
TOTAL AREA(ACRES) = 92.5 PEAK FLOW RATE(CFS) = 50.66

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A-8

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FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 18.84
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.748
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 7.20 0.60 0.100 -
USER-DEFINED - 0.70 0.60 0.850 -
USER-DEFINED - 7.60 0.60 0.100 -
USER-DEFINED - 0.30 0.60 0.850 -
USER-DEFINED - 4.70 0.60 0.100 -
USER-DEFINED - 0.40 0.60 0.850 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.150
SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 12.37
EFFECTIVE AREA(ACRES) = 113.40 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 113.4 PEAK FLOW RATE(CFS) = 63.03

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A-7

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FLOW PROCESS FROM NODE 107.00 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) = 485.00 DOWNSTREAM(FEET) = 480.00
FLOW LENGTH(FEET) = 933.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.22
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 63.03
PIPE TRAVEL TIME(MIN.) = 1.89 Tc(MIN.) = 20.73
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
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 20.73
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.707
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 3.50 0.60 0.100 -
USER-DEFINED - 0.60 0.60 0.900 -
USER-DEFINED - 2.80 0.60 0.100 -
USER-DEFINED - 0.80 0.60 0.900 -
USER-DEFINED - 0.60 0.60 0.100 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.235
SUBAREA AREA(ACRES) = 8.30 SUBAREA RUNOFF(CFS) = 4.23
EFFECTIVE AREA(ACRES) = 121.70 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 121.7 PEAK FLOW RATE(CFS) = 63.07

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A-18

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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.) = 20.73
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.707
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.40 0.60 0.200 -
USER-DEFINED - 5.50 0.60 0.200 -
USER-DEFINED - 3.20 0.60 0.200 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 4.81
EFFECTIVE AREA(ACRES) = 130.80 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 130.8 PEAK FLOW RATE(CFS) = 67.88

```

A-9

```

*****
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.) = 20.73
RAINFALL INTENSITY(INCH/HR) = 0.71
AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.22
EFFECTIVE STREAM AREA(ACRES) = 130.80
TOTAL STREAM AREA(ACRES) = 130.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 67.88

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
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.555

A-10

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" - 0.40 0.60 0.900 0 8.68
COMMERCIAL - 0.30 0.60 0.100 0 5.42
PUBLIC PARK - 1.30 0.60 0.850 0 8.61
RESIDENTIAL
".4 DWELLING/ACRE" - 1.00 0.60 0.900 0 8.68
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.798
SUBAREA RUNOFF(CFS) = 2.91
TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 2.91

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) = 5.04

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.28
HALFSTREET FLOOD WIDTH(FEET) = 6.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.55
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.26
STREET FLOW TRAVEL TIME(MIN.) = 1.89 Tc(MIN.) = 7.31
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.351

A-11

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.30 0.60 0.100 -
USER-DEFINED - 0.30 0.60 0.900 -
USER-DEFINED - 1.00 0.60 0.100 -
USER-DEFINED - 0.30 0.60 0.900 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.223
SUBAREA AREA(ACRES) = 3.90 SUBAREA RUNOFF(CFS) = 4.27
EFFECTIVE AREA(ACRES) = 6.90 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 6.62

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.30 HALFSTREET FLOOD WIDTH(FEET) = 7.53
FLOW VELOCITY(FEET/SEC.) = 4.73 DEPTH*VELOCITY(FT*FT/SEC.) = 1.40
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) = 10.31
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.37
HALFSTREET FLOOD WIDTH(FEET) = 11.45
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.78
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.39
STREET FLOW TRAVEL TIME(MIN.) = 1.71 Tc(MIN.) = 9.02
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.165

A-12

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 5.00 0.60 0.100 -

USER-DEFINED - 2.20 0.60 0.900 -
 USER-DEFINED - 1.00 0.60 0.100 -
 USER-DEFINED - 0.30 0.60 0.900 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335
 SUBAREA AREA (ACRES) = 8.50 SUBAREA RUNOFF (CFS) = 7.38
 EFFECTIVE AREA (ACRES) = 15.40 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.40
 TOTAL AREA (ACRES) = 15.4 PEAK FLOW RATE (CFS) = 12.85

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.39 HALFSTREET FLOOD WIDTH (FEET) = 12.70
 FLOW VELOCITY (FEET/SEC.) = 3.93 DEPTH*VELOCITY (FT*FT/SEC.) = 1.53
 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 18.0 INCH PIPE IS 11.8 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 10.48
 ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 12.85
 PIPE TRAVEL TIME (MIN.) = 1.12 Tc (MIN.) = 10.14
 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.) = 10.14
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.054

A-13

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.60	0.60	0.100	-
USER-DEFINED	-	0.20	0.60	0.850	-
USER-DEFINED	-	1.10	0.60	0.900	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455
 SUBAREA AREA (ACRES) = 2.90 SUBAREA RUNOFF (CFS) = 2.04
 EFFECTIVE AREA (ACRES) = 18.30 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.41
 TOTAL AREA (ACRES) = 18.3 PEAK FLOW RATE (CFS) = 13.34

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

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

MAINLINE Tc (MIN.) = 10.14
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.054
 SUBAREA LOSS RATE DATA (AMC II):

A-14

DEVELOPMENT TYPE/
 LAND USE
 USER-DEFINED - 9.00 0.60 0.100 -
 USER-DEFINED - 1.90 0.60 0.850 -
 USER-DEFINED - 2.70 0.60 0.900 -
 USER-DEFINED - 4.10 0.60 0.100 -
 USER-DEFINED - 0.30 0.60 0.900 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313
 SUBAREA AREA (ACRES) = 18.00 SUBAREA RUNOFF (CFS) = 14.04
 EFFECTIVE AREA (ACRES) = 36.30 AREA-AVERAGED Fm (INCH/HR) = 0.22
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.36
 TOTAL AREA (ACRES) = 36.3 PEAK FLOW RATE (CFS) = 27.38

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

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

MAINLINE Tc (MIN.) = 10.14
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.054

A-15

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.50	0.60	0.100	-
USER-DEFINED	-	1.20	0.60	0.850	-
USER-DEFINED	-	3.80	0.60	0.900	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.515
 SUBAREA AREA (ACRES) = 9.50 SUBAREA RUNOFF (CFS) = 6.37
 EFFECTIVE AREA (ACRES) = 45.80 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.39
 TOTAL AREA (ACRES) = 45.8 PEAK FLOW RATE (CFS) = 33.75

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

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

MAINLINE Tc (MIN.) = 10.14
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.054

OA-3

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	5.30	0.60	1.000	-
USER-DEFINED	-	0.30	0.60	1.000	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 2.29
 EFFECTIVE AREA (ACRES) = 51.40 AREA-AVERAGED Fm (INCH/HR) = 0.27
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 51.4 PEAK FLOW RATE (CFS) = 36.04

 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 24.0 INCH PIPE IS 19.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.37
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 36.04
PIPE TRAVEL TIME(MIN.) = 1.27 Tc(MIN.) = 11.41
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.) = 11.41
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.998
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp      Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED         -        3.40    0.60    0.100  -
USER-DEFINED         -       11.00    0.60    0.100  -
USER-DEFINED         -        1.80    0.60    0.850  -
USER-DEFINED         -        1.50    0.60    0.900  -
USER-DEFINED         -        3.20    0.60    0.100  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.222
SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 16.27
EFFECTIVE AREA(ACRES) = 72.30 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 72.3 PEAK FLOW RATE(CFS) = 49.72

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A-16

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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)<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 480.00
FLOW LENGTH(FEET) = 1110.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.10
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 49.72
PIPE TRAVEL TIME(MIN.) = 1.02 Tc(MIN.) = 12.43
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.) = 12.43
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.953
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp      Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED         -        3.10    0.60    0.100  -

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A-17

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USER-DEFINED         -        1.40    0.60    0.850  -
USER-DEFINED         -        1.10    0.60    0.900  -
USER-DEFINED         -        5.10    0.60    0.100  -
USER-DEFINED         -        1.90    0.60    0.850  -
USER-DEFINED         -        3.60    0.60    0.900  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.485
SUBAREA AREA(ACRES) = 16.20 SUBAREA RUNOFF(CFS) = 9.66
EFFECTIVE AREA(ACRES) = 88.50 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 88.5 PEAK FLOW RATE(CFS) = 56.45

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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.) = 12.43
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.953
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp      Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED         -        2.70    0.60    0.100  -
USER-DEFINED         -        0.10    0.60    0.850  -
USER-DEFINED         -        0.50    0.60    0.900  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 2.40
EFFECTIVE AREA(ACRES) = 91.80 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 91.8 PEAK FLOW RATE(CFS) = 58.85

```

A-17

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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<<<<

```

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 12.43
RAINFALL INTENSITY(INCH/HR) = 0.95
AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.40
EFFECTIVE STREAM AREA(ACRES) = 91.80
TOTAL STREAM AREA(ACRES) = 91.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 58.85

```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	67.88	20.73	0.707	0.60(0.13)	0.22	130.8	100.00
2	58.85	12.43	0.953	0.60(0.24)	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	116.93	12.43	0.953	0.60 (0.19)	0.32	170.2	110.00
2	106.39	20.73	0.707	0.60 (0.18)	0.29	222.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 116.93 Tc(MIN.) = 12.43
EFFECTIVE AREA(ACRES) = 170.24 AREA-AVERAGED Fm(INCH/HR) = 0.19
AREA-AVERAGED Fp(INCH/HR) = 0.60 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 48.0 INCH PIPE IS 38.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.90
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 116.93
PIPE TRAVEL TIME(MIN.) = 1.38 Tc(MIN.) = 13.81
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.) = 13.81 **A-19**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.893
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.10	0.60	0.100	-
USER-DEFINED	-	3.60	0.60	0.100	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 3.52
EFFECTIVE AREA(ACRES) = 174.94 AREA-AVERAGED Fm(INCH/HR) = 0.19
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 227.3 PEAK FLOW RATE(CFS) = 116.93
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.) = 13.81
RAINFALL INTENSITY(INCH/HR) = 0.89
AREA-AVERAGED Fm(INCH/HR) = 0.19

AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA(ACRES) = 174.94
TOTAL STREAM AREA(ACRES) = 227.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 116.93

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.) = 6.88
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.397 **A-20**
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	-	0.50	0.60	0.100	0	6.88
PUBLIC PARK	-	0.20	0.60	0.850	0	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	-	2.70	0.60	0.200	0	7.33
RESIDENTIAL						
".4 DWELLING/ACRE"	-	1.40	0.60	0.900	0	11.02
PUBLIC PARK	-	0.10	0.60	0.850	0	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	-	1.30	0.60	0.200	0	7.33

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.381
SUBAREA RUNOFF(CFS) = 6.52
TOTAL AREA(ACRES) = 6.20 PEAK FLOW RATE(CFS) = 6.52

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 **A-20**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.397
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.15
EFFECTIVE AREA(ACRES) = 6.40 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 6.4 PEAK FLOW RATE(CFS) = 6.67

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
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.69
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.67
PIPE TRAVEL TIME(MIN.) = 0.92 Tc(MIN.) = 7.80
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.) = 7.80
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.298
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 5.40 0.60 0.200 -
USER-DEFINED - 2.40 0.60 0.900 -
USER-DEFINED - 0.70 0.60 0.100 -
USER-DEFINED - 0.60 0.60 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.423
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 8.55
EFFECTIVE AREA(ACRES) = 15.50 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 15.5 PEAK FLOW RATE(CFS) = 14.65

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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 21.0 INCH PIPE IS 12.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.42
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.65
PIPE TRAVEL TIME(MIN.) = 1.82 Tc(MIN.) = 9.62
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.) = 9.62
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.101
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 7.60 0.60 0.200 -

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USER-DEFINED - 1.40 0.60 0.100 -
USER-DEFINED - 2.30 0.60 0.200 -
USER-DEFINED - 6.50 0.60 0.900 -
USER-DEFINED - 8.40 0.60 0.600 -
USER-DEFINED - 0.50 0.60 0.200 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.491
SUBAREA AREA(ACRES) = 26.70 SUBAREA RUNOFF(CFS) = 19.37
EFFECTIVE AREA(ACRES) = 42.20 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 42.2 PEAK FLOW RATE(CFS) = 31.28

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

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

MAINLINE Tc(MIN.) = 9.62
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.101
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.30 0.60 0.100 -
USER-DEFINED - 1.10 0.60 0.850 -
USER-DEFINED - 2.00 0.60 0.200 -
USER-DEFINED - 3.80 0.60 0.900 -
USER-DEFINED - 3.80 0.60 0.600 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.642
SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 7.08
EFFECTIVE AREA(ACRES) = 53.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 53.2 PEAK FLOW RATE(CFS) = 38.36

A-22

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

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

ELEVATION DATA: UPSTREAM(FEET) = 606.00 DOWNSTREAM(FEET) = 604.00
FLOW LENGTH(FEET) = 222.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.92
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.36
PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 10.04
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 124.00 = 2006.00 FEET.

FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.04
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.058
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

A-23

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	0.10	0.60	0.200	-
USER-DEFINED	-	1.60	0.60	0.100	-
USER-DEFINED	-	0.20	0.60	0.850	-
USER-DEFINED	-	0.30	0.60	0.200	-
USER-DEFINED	-	2.10	0.60	0.100	-
USER-DEFINED	-	0.60	0.60	0.850	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.231
SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 4.06
EFFECTIVE AREA (ACRES) = 58.10 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
TOTAL AREA (ACRES) = 58.1 PEAK FLOW RATE (CFS) = 40.39

FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 10.04
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.058
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.60	0.200	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF (CFS) = 0.17
EFFECTIVE AREA (ACRES) = 58.30 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
TOTAL AREA (ACRES) = 58.3 PEAK FLOW RATE (CFS) = 40.56

A-23

FLOW PROCESS FROM NODE 124.00 TO NODE 125.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 604.00 DOWNSTREAM (FEET) = 546.00
FLOW LENGTH (FEET) = 1271.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 16.48
ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 40.56
PIPE TRAVEL TIME (MIN.) = 1.29 Tc (MIN.) = 11.32
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 125.00 = 3277.00 FEET.

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

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

MAINLINE Tc (MIN.) = 11.32
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.002
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.60	0.200	-

A-25

USER-DEFINED	-	1.20	0.60	0.100	-
USER-DEFINED	-	1.20	0.60	0.900	-
USER-DEFINED	-	0.10	0.60	0.200	-
USER-DEFINED	-	1.60	0.60	0.100	-
USER-DEFINED	-	3.00	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.550
SUBAREA AREA (ACRES) = 7.60 SUBAREA RUNOFF (CFS) = 4.60
EFFECTIVE AREA (ACRES) = 65.90 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
TOTAL AREA (ACRES) = 65.9 PEAK FLOW RATE (CFS) = 42.18

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

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

MAINLINE Tc (MIN.) = 11.32
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.002
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.90	0.60	0.200	-
USER-DEFINED	-	0.60	0.60	0.900	-
USER-DEFINED	-	0.30	0.60	0.600	-
USER-DEFINED	-	5.00	0.60	0.200	-
USER-DEFINED	-	2.30	0.60	0.850	-
USER-DEFINED	-	3.50	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.530
SUBAREA AREA (ACRES) = 13.60 SUBAREA RUNOFF (CFS) = 8.37
EFFECTIVE AREA (ACRES) = 79.50 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
TOTAL AREA (ACRES) = 79.5 PEAK FLOW RATE (CFS) = 50.55

A-25.1

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

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

MAINLINE Tc (MIN.) = 11.32
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.002
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	10.20	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA (ACRES) = 10.20 SUBAREA RUNOFF (CFS) = 5.89
EFFECTIVE AREA (ACRES) = 89.70 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 89.7 PEAK FLOW RATE (CFS) = 56.45

A-25.1

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)<<<<<

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=====
ELEVATION DATA: UPSTREAM(FEET) = 546.00 DOWNSTREAM(FEET) = 525.00
FLOW LENGTH(FEET) = 562.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 22.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.28
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 56.45
PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 11.90
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 126.00 = 3839.00 FEET.

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FLOW PROCESS FROM NODE 126.00 TO NODE 126.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 11.90
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.976
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
  LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         5.90   0.60  0.200  -
USER-DEFINED        -         0.10   0.60  0.100  -
USER-DEFINED        -         0.60   0.60  0.900  -
USER-DEFINED        -         6.00   0.60  0.200  -
USER-DEFINED        -         1.10   0.60  0.100  -
USER-DEFINED        -         4.70   0.60  0.900  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.395
SUBAREA AREA(ACRES) = 18.40 SUBAREA RUNOFF(CFS) = 12.25
EFFECTIVE AREA(ACRES) = 108.10 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 108.1 PEAK FLOW RATE(CFS) = 66.65

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A-26

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*****
FLOW PROCESS FROM NODE 126.00 TO NODE 127.00 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) = 525.00 DOWNSTREAM(FEET) = 514.00
FLOW LENGTH(FEET) = 607.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.96
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 66.65
PIPE TRAVEL TIME(MIN.) = 0.78 Tc(MIN.) = 12.68
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 127.00 = 4446.00 FEET.

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*****
FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 12.68
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.942
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
  LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN

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USER-DEFINED        -         1.50   0.60  0.100  -
USER-DEFINED        -         0.20   0.60  0.850  -
USER-DEFINED        -         1.10   0.60  0.200  -
USER-DEFINED        -        12.70   0.60  0.100  -
USER-DEFINED        -         0.80   0.60  0.850  -
USER-DEFINED        -         4.10   0.60  0.900  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303
SUBAREA AREA(ACRES) = 20.40 SUBAREA RUNOFF(CFS) = 13.96
EFFECTIVE AREA(ACRES) = 128.50 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 128.5 PEAK FLOW RATE(CFS) = 77.27

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*****
FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 12.68
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.942
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
  LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         1.20   0.60  0.100  -
USER-DEFINED        -         1.50   0.60  0.850  -
USER-DEFINED        -         0.10   0.60  0.900  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
SUBAREA AREA(ACRES) = 2.80 SUBAREA RUNOFF(CFS) = 1.57
EFFECTIVE AREA(ACRES) = 131.30 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 131.3 PEAK FLOW RATE(CFS) = 78.84

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A-27

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*****
FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 12.68
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.942
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
  LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         1.00   0.60  0.100  -
USER-DEFINED        -         1.30   0.60  0.100  -
USER-DEFINED        -        12.60   0.60  0.100  -
USER-DEFINED        -         1.10   0.60  0.850  -
USER-DEFINED        -         0.10   0.60  0.200  -
USER-DEFINED        -         2.10   0.60  0.900  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.238
SUBAREA AREA(ACRES) = 18.20 SUBAREA RUNOFF(CFS) = 13.09
EFFECTIVE AREA(ACRES) = 149.50 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 149.5 PEAK FLOW RATE(CFS) = 91.93

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A-28

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*****
FLOW PROCESS FROM NODE 127.00 TO NODE 128.00 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) = 514.00 DOWNSTREAM(FEET) = 473.00
FLOW LENGTH(FEET) = 741.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 21.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.97
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 91.93
PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 13.24
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 128.00 = 5187.00 FEET.

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*****
FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 13.24
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.917
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.20 0.60 0.100 -
USER-DEFINED - 0.40 0.60 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.223
SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 1.83
EFFECTIVE AREA(ACRES) = 152.10 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 152.1 PEAK FLOW RATE(CFS) = 91.93
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

```

A-29

```

*****
FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 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.) = 13.24
RAINFALL INTENSITY(INCH/HR) = 0.92
AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.43
EFFECTIVE STREAM AREA(ACRES) = 152.10
TOTAL STREAM AREA(ACRES) = 152.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 91.93

```

```

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 116.93 13.81 0.893 0.60( 0.19) 0.31 174.9 110.00
1 106.39 22.12 0.682 0.60( 0.17) 0.29 227.3 100.00
2 91.93 13.24 0.917 0.60( 0.26) 0.43 152.1 120.00

```

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
1 208.03 13.24 0.917 0.60( 0.22) 0.37 319.9 120.00
2 205.41 13.81 0.893 0.60( 0.22) 0.37 327.0 110.00
3 165.55 22.12 0.682 0.60( 0.21) 0.34 379.4 100.00

```

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 208.03 Tc(MIN.) = 13.24
EFFECTIVE AREA(ACRES) = 319.88 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 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 57.0 INCH PIPE IS 41.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.06
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 208.03
PIPE TRAVEL TIME(MIN.) = 1.65 Tc(MIN.) = 14.89
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.) = 14.89
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.845
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.60 0.60 0.100 -
USER-DEFINED - 0.60 0.60 0.900 -
USER-DEFINED - 1.80 0.60 0.100 -
USER-DEFINED - 1.40 0.60 0.900 -
USER-DEFINED - 0.80 0.60 0.100 -
USER-DEFINED - 1.60 0.60 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524
SUBAREA AREA(ACRES) = 6.80 SUBAREA RUNOFF(CFS) = 3.25
EFFECTIVE AREA(ACRES) = 326.68 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 386.2 PEAK FLOW RATE(CFS) = 208.03
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

```

A-30

```

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

```

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

=====

MAINLINE Tc(MIN.) = 14.89 A-31

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.845

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.50	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	0.850	-
USER-DEFINED	-	0.10	0.60	0.200	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	1.50	0.60	0.600	-
USER-DEFINED	-	0.20	0.60	0.500	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.344
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 2.70
EFFECTIVE AREA(ACRES) = 331.38 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 390.9 PEAK FLOW RATE(CFS) = 208.03
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.) = 14.89 A-31

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.845

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.90	0.60	0.400	-
USER-DEFINED	-	4.70	0.60	0.100	-
USER-DEFINED	-	1.30	0.60	0.850	-
USER-DEFINED	-	0.90	0.60	0.200	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	3.80	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.386
SUBAREA AREA(ACRES) = 13.70 SUBAREA RUNOFF(CFS) = 7.56
EFFECTIVE AREA(ACRES) = 345.08 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 404.6 PEAK FLOW RATE(CFS) = 208.03
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.) = 14.89 A-31

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.845

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.40	0.60	0.500	-
USER-DEFINED	-	0.70	0.60	0.400	-
USER-DEFINED	-	5.00	0.60	0.100	-

USER-DEFINED - 0.10 0.60 0.850 -
USER-DEFINED - 10.30 0.60 0.200 -
USER-DEFINED - 0.10 0.60 0.900 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.253
SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 12.84
EFFECTIVE AREA(ACRES) = 365.68 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 425.2 PEAK FLOW RATE(CFS) = 208.03
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.) = 14.89 A-31

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.845

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.30	0.60	0.600	-
USER-DEFINED	-	3.90	0.60	0.500	-
USER-DEFINED	-	2.30	0.60	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.487
SUBAREA AREA(ACRES) = 7.50 SUBAREA RUNOFF(CFS) = 3.73
EFFECTIVE AREA(ACRES) = 373.18 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 432.7 PEAK FLOW RATE(CFS) = 209.96

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 48.0 INCH PIPE IS 38.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.61
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 209.96
PIPE TRAVEL TIME(MIN.) = 1.52 Tc(MIN.) = 16.41
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.) = 16.41 A-32

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.806

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.30	0.60	0.100	-
USER-DEFINED	-	1.20	0.60	0.900	-

```

USER-DEFINED          -      0.10      0.60      0.600      -
USER-DEFINED          -      1.30      0.60      0.100      -
USER-DEFINED          -      0.10      0.60      0.850      -
USER-DEFINED          -      3.00      0.60      0.900      -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.598
SUBAREA AREA(ACRES) = 7.00      SUBAREA RUNOFF(CFS) = 2.82
EFFECTIVE AREA(ACRES) = 380.18      AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60      AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 439.7      PEAK FLOW RATE(CFS) = 209.96
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

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```

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

MAINLINE Tc(MIN.) = 16.41
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.806
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED          -      2.50      0.60      0.600      -
USER-DEFINED          -      0.80      0.60      0.100      -
USER-DEFINED          -      1.30      0.60      0.900      -
USER-DEFINED          -      3.30      0.60      0.600      -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.599
SUBAREA AREA(ACRES) = 7.90      SUBAREA RUNOFF(CFS) = 3.18
EFFECTIVE AREA(ACRES) = 388.08      AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60      AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 447.6      PEAK FLOW RATE(CFS) = 209.96
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

```

A-32

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

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```

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

```

```

*****
FLOW PROCESS FROM NODE 150.00 TO NODE 151.00 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) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 765.00      DOWNSTREAM(FEET) = 675.00

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```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.312
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.134
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
"OPEN BRUSH"          -      1.50      0.60      1.000      0      9.31
NATURAL FAIR COVER

```

OA-4

```

"WOODLAND,GRASS"      -      0.40      0.60      1.000      0      9.31
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.91
TOTAL AREA(ACRES) = 1.90      PEAK FLOW RATE(CFS) = 0.91

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

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```

>>>>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
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.012
SUBAREA LOSS RATE DATA(AMC II):

```

OA-5

```

DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED          -      4.90      0.60      1.000      -
USER-DEFINED          -      2.40      0.60      1.000      -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.28
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.97
AVERAGE FLOW DEPTH(FEET) = 0.44      TRAVEL TIME(MIN.) = 1.77
Tc(MIN.) = 11.08
SUBAREA AREA(ACRES) = 7.30      SUBAREA RUNOFF(CFS) = 2.71
EFFECTIVE AREA(ACRES) = 9.20      AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60      AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 9.2      PEAK FLOW RATE(CFS) = 3.42

```

```

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.51      FLOW VELOCITY(FEET/SEC.) = 4.44
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
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.71
ESTIMATED PIPE DIAMETER(INCH) = 18.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.42
PIPE TRAVEL TIME(MIN.) = 1.77      Tc(MIN.) = 12.85
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.) = 12.85
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.934

OA-6

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 5.10 0.60 1.000 -
USER-DEFINED - 4.00 0.60 1.000 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 2.74
EFFECTIVE AREA(ACRES) = 18.30 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 18.3 PEAK FLOW RATE(CFS) = 5.51

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 21.0 INCH PIPE IS 16.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.67
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.51
PIPE TRAVEL TIME(MIN.) = 4.44 Tc(MIN.) = 17.29
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.) = 17.29
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.785

OA-7

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.30 0.60 1.000 -
USER-DEFINED - 5.70 0.60 1.000 -
USER-DEFINED - 3.40 0.60 1.000 -
USER-DEFINED - 0.10 0.60 1.000 -
USER-DEFINED - 2.10 0.60 1.000 -
USER-DEFINED - 1.60 0.60 1.000 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 13.20 SUBAREA RUNOFF(CFS) = 2.20
EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 5.51
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

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

MAINLINE Tc(MIN.) = 17.29
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.785

OA-7

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.20 0.60 1.000 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.03
EFFECTIVE AREA(ACRES) = 31.70 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.7 PEAK FLOW RATE(CFS) = 5.51
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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 21.0 INCH PIPE IS 14.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.24
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.51
PIPE TRAVEL TIME(MIN.) = 4.68 Tc(MIN.) = 21.98
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 155.00 = 2873.00 FEET.

FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 21.98
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.684

OA-8

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.60 0.60 1.000 -
USER-DEFINED - 1.60 0.60 1.000 -
USER-DEFINED - 1.80 0.60 1.000 -
USER-DEFINED - 1.50 0.60 1.000 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 6.50 SUBAREA RUNOFF(CFS) = 0.49
EFFECTIVE AREA(ACRES) = 38.20 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 38.2 PEAK FLOW RATE(CFS) = 5.51
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.99
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.51
 PIPE TRAVEL TIME(MIN.) = 1.66 Tc(MIN.) = 23.64
 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.) = 23.64

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.655

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	1.90	0.60	1.000	-
USER-DEFINED	-	0.40	0.60	1.000	-
USER-DEFINED	-	1.30	0.60	1.000	-
USER-DEFINED	-	4.50	0.60	1.000	-
USER-DEFINED	-	1.30	0.60	1.000	-
USER-DEFINED	-	3.70	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 13.10 SUBAREA RUNOFF(CFS) = 0.64
 EFFECTIVE AREA(ACRES) = 51.30 AREA-AVERAGED Fm(INCH/HR) = 0.60
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 51.3 PEAK FLOW RATE(CFS) = 5.51
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

OA-9

 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
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.92
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.51
 PIPE TRAVEL TIME(MIN.) = 11.59 Tc(MIN.) = 35.22
 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 Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE

1 5.51 35.22 0.518 0.60(0.60) 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 Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
 1 209.96 16.41 0.806 0.60(0.22) 0.37 388.1 120.00
 2 208.81 16.98 0.792 0.60(0.22) 0.37 395.2 110.00
 3 172.10 25.47 0.623 0.60(0.21) 0.36 447.6 100.00
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 130.00 = 9651.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
 1 213.95 16.41 0.806 0.60(0.25) 0.41 412.0 120.00
 2 212.87 16.98 0.792 0.60(0.25) 0.41 420.0 110.00
 3 176.90 25.47 0.623 0.60(0.24) 0.40 484.7 100.00
 4 145.66 35.22 0.518 0.60(0.25) 0.42 498.9 150.00
 TOTAL AREA(ACRES) = 498.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 213.95 Tc(MIN.) = 16.412
 EFFECTIVE AREA(ACRES) = 411.98 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.41
 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.) = 16.41

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.806

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	1.60	0.60	1.000	-
USER-DEFINED	-	1.30	0.60	1.000	-
USER-DEFINED	-	2.60	0.60	0.900	-
USER-DEFINED	-	1.90	0.60	1.000	-
USER-DEFINED	-	0.70	0.60	1.000	-
USER-DEFINED	-	0.80	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.971
 SUBAREA AREA(ACRES) = 8.90 SUBAREA RUNOFF(CFS) = 1.79
 EFFECTIVE AREA(ACRES) = 420.88 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 507.8 PEAK FLOW RATE(CFS) = 213.95
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

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

=====

MAINLINE Tc(MIN.) = 16.41

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.806

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.850	-
USER-DEFINED	-	1.50	0.60	0.900	-
USER-DEFINED	-	0.40	0.60	1.000	-
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.30	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.919

SUBAREA AREA (ACRES) = 2.40 SUBAREA RUNOFF (CFS) = 0.55

EFFECTIVE AREA (ACRES) = 423.28 AREA-AVERAGED Fm (INCH/HR) = 0.26

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.43

TOTAL AREA (ACRES) = 510.2 PEAK FLOW RATE (CFS) = 213.95

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====
END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 510.2 TC (MIN.) = 16.41

EFFECTIVE AREA (ACRES) = 423.28 AREA-AVERAGED Fm (INCH/HR) = 0.26

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.426

PEAK FLOW RATE (CFS) = 213.95

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	213.95	16.41	0.806	0.60 (0.26)	0.43	423.3	120.00
2	212.87	16.98	0.792	0.60 (0.25)	0.42	431.3	110.00
3	176.90	25.47	0.623	0.60 (0.25)	0.42	496.0	100.00
4	145.66	35.22	0.518	0.60 (0.26)	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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Analysis prepared by:

Michael Baker International
5 Hutton Centre Drive, Suite 500
Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA A ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 5-YR EV AUGUST 2018 CCHI *

FILE NAME: PA3A05EV.DAT
TIME/DATE OF STUDY: 10:39 08/15/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 5.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 2.180
- 2) 10.00; 1.510
- 3) 15.00; 1.200
- 4) 20.00; 1.020
- 5) 25.00; 0.900
- 6) 30.00; 0.830
- 7) 40.00; 0.690
- 8) 50.00; 0.610
- 9) 60.00; 0.550
- 10) 90.00; 0.440
- 11) 120.00; 0.370
- 12) 180.00; 0.310
- 13) 360.00; 0.210
- 14) 1200.00; 0.090

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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.589

OA-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 "OPEN BRUSH"	-	1.10	0.50	1.000	75	9.41

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.08
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 1.08

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

OA-2

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.453
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.90	0.50	1.000	-
USER-DEFINED	-	2.60	0.50	1.000	-
USER-DEFINED	-	0.70	0.50	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.983
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.90
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.26
AVERAGE FLOW DEPTH(FEET) = 0.48 TRAVEL TIME(MIN.) = 1.50
Tc(MIN.) = 10.92
SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 3.63
EFFECTIVE AREA(ACRES) = 5.30 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.99
TOTAL AREA(ACRES) = 5.3 PEAK FLOW RATE(CFS) = 4.58

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.57 FLOW VELOCITY(FEET/SEC.) = 4.74
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) = 5.66

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.27

HALFSTREET FLOOD WIDTH(FEET) = 6.16

AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.31

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.45

STREET FLOW TRAVEL TIME(MIN.) = 0.83 Tc(MIN.) = 11.75

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.402

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.10	0.50	0.900	-
USER-DEFINED	-	1.00	0.50	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.519

SUBAREA AREA(ACRES) = 2.10 SUBAREA RUNOFF(CFS) = 2.16

EFFECTIVE AREA(ACRES) = 7.40 AREA-AVERAGED Fm(INCH/HR) = 0.43

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.85

TOTAL AREA(ACRES) = 7.4 PEAK FLOW RATE(CFS) = 6.49

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.28 HALFSTREET FLOOD WIDTH(FEET) = 6.78

FLOW VELOCITY(FEET/SEC.) = 5.37 DEPTH*VELOCITY(FT*FT/SEC.) = 1.52

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) = 11.58

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.36

HALFSTREET FLOOD WIDTH(FEET) = 10.90

AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.61

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.65

STREET FLOW TRAVEL TIME(MIN.) = 1.78 Tc(MIN.) = 13.53

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.291

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.10	0.50	0.100	-
USER-DEFINED	-	0.30	0.50	0.900	-
USER-DEFINED	-	6.60	0.50	0.100	-
USER-DEFINED	-	1.80	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.271

SUBAREA AREA(ACRES) = 9.80 SUBAREA RUNOFF(CFS) = 10.19

EFFECTIVE AREA(ACRES) = 17.20 AREA-AVERAGED Fm(INCH/HR) = 0.26

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.52

TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 15.94

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 12.62

FLOW VELOCITY(FEET/SEC.) = 4.94 DEPTH*VELOCITY(FT*FT/SEC.) = 1.91

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 18.0 INCH PIPE IS 13.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 11.12

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

PIPE-FLOW(CFS) = 15.94

PIPE TRAVEL TIME(MIN.) = 2.18 Tc(MIN.) = 15.71

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.) = 15.71

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.174

SUBAREA LOSS RATE DATA(AMC II):

A-2

A-1

A-3

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	3.90	0.50	0.100	-
USER-DEFINED	-	0.20	0.50	0.850	-
USER-DEFINED	-	0.90	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.255
SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 5.28
EFFECTIVE AREA (ACRES) = 22.80 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 22.8 PEAK FLOW RATE (CFS) = 19.41

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

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

MAINLINE Tc (MIN.) = 15.71
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.174
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	0.30	0.50	0.850	-
USER-DEFINED	-	0.40	0.50	0.900	-
USER-DEFINED	-	5.00	0.50	0.100	-
USER-DEFINED	-	2.10	0.50	0.850	-
USER-DEFINED	-	0.80	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA (ACRES) = 9.20 SUBAREA RUNOFF (CFS) = 8.07
EFFECTIVE AREA (ACRES) = 32.00 AREA-AVERAGED Fm (INCH/HR) = 0.22
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.44
TOTAL AREA (ACRES) = 32.0 PEAK FLOW RATE (CFS) = 27.48

A-4

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

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

MAINLINE Tc (MIN.) = 15.71
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.174
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.80	0.50	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 1.82
EFFECTIVE AREA (ACRES) = 33.80 AREA-AVERAGED Fm (INCH/HR) = 0.21
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.42
TOTAL AREA (ACRES) = 33.8 PEAK FLOW RATE (CFS) = 29.30

A-4

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 24.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 11.29
ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 29.30
PIPE TRAVEL TIME (MIN.) = 1.19 Tc (MIN.) = 16.90
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.) = 16.90
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.132
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.80	0.50	0.100	-
USER-DEFINED	-	7.60	0.50	0.100	-
USER-DEFINED	-	0.40	0.50	0.850	-
USER-DEFINED	-	10.50	0.50	0.100	-
USER-DEFINED	-	0.30	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.125
SUBAREA AREA (ACRES) = 21.60 SUBAREA RUNOFF (CFS) = 20.78
EFFECTIVE AREA (ACRES) = 55.40 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.31
TOTAL AREA (ACRES) = 55.4 PEAK FLOW RATE (CFS) = 48.78

A-5

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

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

MAINLINE Tc (MIN.) = 16.90
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.132
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	6.80	0.50	0.100	-
USER-DEFINED	-	12.10	0.50	0.100	-
USER-DEFINED	-	1.00	0.50	0.850	-
USER-DEFINED	-	4.50	0.50	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.131
SUBAREA AREA (ACRES) = 24.40 SUBAREA RUNOFF (CFS) = 23.41
EFFECTIVE AREA (ACRES) = 79.80 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.25
TOTAL AREA (ACRES) = 79.8 PEAK FLOW RATE (CFS) = 72.20

A-6

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 33.0 INCH PIPE IS 26.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.36
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 72.20
PIPE TRAVEL TIME(MIN.) = 0.94 Tc(MIN.) = 17.84
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.) = 17.84
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.098
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 3.40 0.50 0.100 -
USER-DEFINED - 6.70 0.50 0.100 -
USER-DEFINED - 0.10 0.50 0.850 -
USER-DEFINED - 2.50 0.50 0.100 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.106
SUBAREA AREA(ACRES) = 12.70 SUBAREA RUNOFF(CFS) = 11.94
EFFECTIVE AREA(ACRES) = 92.50 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.23
TOTAL AREA(ACRES) = 92.5 PEAK FLOW RATE(CFS) = 81.72
```

A-8

```
*****
FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81
-----
```

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

```
MAINLINE Tc(MIN.) = 17.84
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.098
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 7.20 0.50 0.100 -
USER-DEFINED - 0.70 0.50 0.850 -
USER-DEFINED - 7.60 0.50 0.100 -
USER-DEFINED - 0.30 0.50 0.850 -
USER-DEFINED - 4.70 0.50 0.100 -
USER-DEFINED - 0.40 0.50 0.850 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.150
SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 19.24
EFFECTIVE AREA(ACRES) = 113.40 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 113.4 PEAK FLOW RATE(CFS) = 100.96
```

A-7

```
*****
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 51.0 INCH PIPE IS 36.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.30
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 100.96
PIPE TRAVEL TIME(MIN.) = 1.67 Tc(MIN.) = 19.51
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.) = 19.51
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.038
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 3.50 0.50 0.100 -
USER-DEFINED - 0.60 0.50 0.900 -
USER-DEFINED - 2.80 0.50 0.100 -
USER-DEFINED - 0.80 0.50 0.900 -
USER-DEFINED - 0.60 0.50 0.100 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.235
SUBAREA AREA(ACRES) = 8.30 SUBAREA RUNOFF(CFS) = 6.87
EFFECTIVE AREA(ACRES) = 121.70 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 121.7 PEAK FLOW RATE(CFS) = 101.68
```

A-18

```
*****
FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81
-----
```

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

```
MAINLINE Tc(MIN.) = 19.51
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.038
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.40 0.50 0.200 -
USER-DEFINED - 5.50 0.50 0.200 -
USER-DEFINED - 3.20 0.50 0.200 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 7.68
EFFECTIVE AREA(ACRES) = 130.80 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.22
TOTAL AREA(ACRES) = 130.8 PEAK FLOW RATE(CFS) = 109.36
```

A-9

```
*****
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.) = 19.51
RAINFALL INTENSITY(INCH/HR) = 1.04
AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.22
EFFECTIVE STREAM AREA(ACRES) = 130.80
TOTAL STREAM AREA(ACRES) = 130.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 109.36

```

```

*****
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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.124

```

```

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"    -         0.40    0.50    0.900    75    8.68
COMMERCIAL            -         0.30    0.50    0.100    75    5.42
PUBLIC PARK           -         1.30    0.50    0.850    75    8.61
RESIDENTIAL
".4 DWELLING/ACRE"    -         1.00    0.50    0.900    75    8.68
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.798
SUBAREA RUNOFF(CFS) = 4.66
TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 4.66

```

```

*****
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) = 7.77

```

```

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 8.22
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.88
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.51
STREET FLOW TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 7.18
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.887

```

A-11

```

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED          -         2.30    0.50    0.100    -
USER-DEFINED          -         0.30    0.50    0.900    -
USER-DEFINED          -         1.00    0.50    0.100    -
USER-DEFINED          -         0.30    0.50    0.900    -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.223
SUBAREA AREA(ACRES) = 3.90 SUBAREA RUNOFF(CFS) = 6.23
EFFECTIVE AREA(ACRES) = 6.90 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 10.25

```

```

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 9.47
FLOW VELOCITY(FEET/SEC.) = 5.15 DEPTH*VELOCITY(FT*FT/SEC.) = 1.71
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) = 16.04

```

```

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 13.95
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.15
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.71
STREET FLOW TRAVEL TIME(MIN.) = 1.56 Tc(MIN.) = 8.74
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.678

```

A-12

```

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED          -         5.00    0.50    0.100    -
USER-DEFINED          -         2.20    0.50    0.900    -

```

```

USER-DEFINED          -      1.00      0.50      0.100      -
USER-DEFINED          -      0.30      0.50      0.900      -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335
SUBAREA AREA(ACRES) = 8.50      SUBAREA RUNOFF(CFS) = 11.56
EFFECTIVE AREA(ACRES) = 15.40      AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.50      AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 15.4      PEAK FLOW RATE(CFS) = 20.51

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44      HALFSTREET FLOOD WIDTH(FEET) = 15.43
FLOW VELOCITY(FEET/SEC.) = 4.42      DEPTH*VELOCITY(FT*FT/SEC.) = 1.94
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 21.0 INCH PIPE IS 14.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.74
ESTIMATED PIPE DIAMETER(INCH) = 21.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.51
PIPE TRAVEL TIME(MIN.) = 1.00      Tc(MIN.) = 9.74
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.) = 9.74
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.545
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
USER-DEFINED      -      1.60      0.50      0.100      -
USER-DEFINED      -      0.20      0.50      0.850      -
USER-DEFINED      -      1.10      0.50      0.900      -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455
SUBAREA AREA(ACRES) = 2.90      SUBAREA RUNOFF(CFS) = 3.44
EFFECTIVE AREA(ACRES) = 18.30      AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.50      AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 18.3      PEAK FLOW RATE(CFS) = 22.09

```

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.) = 9.74
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.545
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS

```

```

LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
USER-DEFINED      -      9.00      0.50      0.100      -
USER-DEFINED      -      1.90      0.50      0.850      -
USER-DEFINED      -      2.70      0.50      0.900      -
USER-DEFINED      -      4.10      0.50      0.100      -
USER-DEFINED      -      0.30      0.50      0.900      -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313
SUBAREA AREA(ACRES) = 18.00      SUBAREA RUNOFF(CFS) = 22.49
EFFECTIVE AREA(ACRES) = 36.30      AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.50      AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 36.3      PEAK FLOW RATE(CFS) = 44.58

```

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.) = 9.74
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.545
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
USER-DEFINED      -      4.50      0.50      0.100      -
USER-DEFINED      -      1.20      0.50      0.850      -
USER-DEFINED      -      3.80      0.50      0.900      -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.515
SUBAREA AREA(ACRES) = 9.50      SUBAREA RUNOFF(CFS) = 11.01
EFFECTIVE AREA(ACRES) = 45.80      AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.50      AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 45.8      PEAK FLOW RATE(CFS) = 55.59

```

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.) = 9.74
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.545
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
USER-DEFINED      -      5.30      0.50      1.000      -
USER-DEFINED      -      0.30      0.50      1.000      -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 5.60      SUBAREA RUNOFF(CFS) = 5.26
EFFECTIVE AREA(ACRES) = 51.40      AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.50      AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 51.4      PEAK FLOW RATE(CFS) = 60.85

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OA-3

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*****
FLOW PROCESS FROM NODE 114.00 TO NODE 115.00 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) = 565.00 DOWNSTREAM(FEET) = 535.00
 FLOW LENGTH(FEET) = 1017.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.43
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 60.85
 PIPE TRAVEL TIME(MIN.) = 1.10 Tc(MIN.) = 10.84
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 115.00 = 2955.00 FEET.

FLOW PROCESS FROM NODE 115.00 TO NODE 115.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.84
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.458 **A-16**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.40	0.50	0.100	-
USER-DEFINED	-	11.00	0.50	0.100	-
USER-DEFINED	-	1.80	0.50	0.850	-
USER-DEFINED	-	1.50	0.50	0.900	-
USER-DEFINED	-	3.20	0.50	0.100	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.222
 SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 25.33
 EFFECTIVE AREA(ACRES) = 72.30 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 72.3 PEAK FLOW RATE(CFS) = 82.18

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)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 480.00
 FLOW LENGTH(FEET) = 1110.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.08
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 82.18
 PIPE TRAVEL TIME(MIN.) = 0.92 Tc(MIN.) = 11.76
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 108.00 = 4065.00 FEET.

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

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

MAINLINE Tc(MIN.) = 11.76
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.401 **A-17**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.10	0.50	0.100	-
USER-DEFINED	-	1.40	0.50	0.850	-

USER-DEFINED - 1.10 0.50 0.900 -
 USER-DEFINED - 5.10 0.50 0.100 -
 USER-DEFINED - 1.90 0.50 0.850 -
 USER-DEFINED - 3.60 0.50 0.900 -
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.485
 SUBAREA AREA(ACRES) = 16.20 SUBAREA RUNOFF(CFS) = 16.89
 EFFECTIVE AREA(ACRES) = 88.50 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 88.5 PEAK FLOW RATE(CFS) = 95.35

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

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

MAINLINE Tc(MIN.) = 11.76
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.401 **A-17**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.70	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.850	-
USER-DEFINED	-	0.50	0.50	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.244
 SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 3.80
 EFFECTIVE AREA(ACRES) = 91.80 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.40
 TOTAL AREA(ACRES) = 91.8 PEAK FLOW RATE(CFS) = 99.14

FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 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.) = 11.76
 RAINFALL INTENSITY(INCH/HR) = 1.40
 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.50
 AREA-AVERAGED Ap = 0.40
 EFFECTIVE STREAM AREA(ACRES) = 91.80
 TOTAL STREAM AREA(ACRES) = 91.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 99.14

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	109.36	19.51	1.038	0.50(0.11)	0.22	130.8	100.00
2	99.14	11.76	1.401	0.50(0.20)	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	190.85	11.76	1.401	0.50(0.16)	0.32	170.7	110.00
2	178.51	19.51	1.038	0.50(0.15)	0.29	222.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 190.85 Tc(MIN.) = 11.76
 EFFECTIVE AREA(ACRES) = 170.66 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.50 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 60.0 INCH PIPE IS 43.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.51
 ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 190.85
 PIPE TRAVEL TIME(MIN.) = 1.20 Tc(MIN.) = 12.96
 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.) = 12.96
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.326 **A-19**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.10	0.50	0.100	-
USER-DEFINED	-	3.60	0.50	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 5.40
 EFFECTIVE AREA(ACRES) = 175.36 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.31
 TOTAL AREA(ACRES) = 227.3 PEAK FLOW RATE(CFS) = 190.85
 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.) = 12.96
 RAINFALL INTENSITY(INCH/HR) = 1.33
 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.50

AREA-AVERAGED Ap = 0.31
 EFFECTIVE STREAM AREA(ACRES) = 175.36
 TOTAL STREAM AREA(ACRES) = 227.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 190.85

 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
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.928 **A-20**

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	-	0.50	0.50	0.100	75	6.88
PUBLIC PARK	-	0.20	0.50	0.850	75	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	-	2.70	0.50	0.200	75	7.33
RESIDENTIAL						
".4 DWELLING/ACRE"	-	1.40	0.50	0.900	75	11.02
PUBLIC PARK	-	0.10	0.50	0.850	75	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	-	1.30	0.50	0.200	75	7.33

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.381
 SUBAREA RUNOFF(CFS) = 9.69
 TOTAL AREA(ACRES) = 6.20 PEAK FLOW RATE(CFS) = 9.69

 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
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.928 **A-20**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.27
 EFFECTIVE AREA(ACRES) = 6.40 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.40
 TOTAL AREA(ACRES) = 6.4 PEAK FLOW RATE(CFS) = 9.96

 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 18.0 INCH PIPE IS 11.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.44
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.96
 PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 7.72
 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.) = 7.72 **A-21**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.816
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	5.40	0.50	0.200	-
USER-DEFINED	-	2.40	0.50	0.900	-
USER-DEFINED	-	0.70	0.50	0.100	-
USER-DEFINED	-	0.60	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.423
 SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 13.14
 EFFECTIVE AREA(ACRES) = 15.50 AREA-AVERAGED Fm(INCH/HR) = 0.21
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 15.5 PEAK FLOW RATE(CFS) = 22.45

 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 24.0 INCH PIPE IS 15.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.45
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 22.45
 PIPE TRAVEL TIME(MIN.) = 1.64 Tc(MIN.) = 9.36
 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.) = 9.36 **A-22**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.596
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	7.60	0.50	0.200	-
USER-DEFINED	-	1.40	0.50	0.100	-
USER-DEFINED	-	2.30	0.50	0.200	-

USER-DEFINED - 6.50 0.50 0.900 -
 USER-DEFINED - 8.40 0.50 0.600 -
 USER-DEFINED - 0.50 0.50 0.200 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.491
 SUBAREA AREA(ACRES) = 26.70 SUBAREA RUNOFF(CFS) = 32.44
 EFFECTIVE AREA(ACRES) = 42.20 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 42.2 PEAK FLOW RATE(CFS) = 51.82

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

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

=====

MAINLINE Tc(MIN.) = 9.36 **A-22**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.596
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.30	0.50	0.100	-
USER-DEFINED	-	1.10	0.50	0.850	-
USER-DEFINED	-	2.00	0.50	0.200	-
USER-DEFINED	-	3.80	0.50	0.900	-
USER-DEFINED	-	3.80	0.50	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.642
 SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 12.62
 EFFECTIVE AREA(ACRES) = 53.20 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 53.2 PEAK FLOW RATE(CFS) = 64.43

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 606.00 DOWNSTREAM(FEET) = 604.00
 FLOW LENGTH(FEET) = 222.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.09
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 64.43
 PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 9.73
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 124.00 = 2006.00 FEET.

 FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 9.73 **A-23**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.546
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.200	-

USER-DEFINED - 1.60 0.50 0.100 -
 USER-DEFINED - 0.20 0.50 0.850 -
 USER-DEFINED - 0.30 0.50 0.200 -
 USER-DEFINED - 2.10 0.50 0.100 -
 USER-DEFINED - 0.60 0.50 0.850 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.231
 SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 6.31
 EFFECTIVE AREA (ACRES) = 58.10 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 58.1 PEAK FLOW RATE (CFS) = 68.39

 FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 9.73 **A-23**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.546
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.50	0.200	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF (CFS) = 0.26
 EFFECTIVE AREA (ACRES) = 58.30 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 58.3 PEAK FLOW RATE (CFS) = 68.65

 FLOW PROCESS FROM NODE 124.00 TO NODE 125.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 604.00 DOWNSTREAM (FEET) = 546.00
 FLOW LENGTH (FEET) = 1271.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.8 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 18.92
 ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 68.65
 PIPE TRAVEL TIME (MIN.) = 1.12 Tc (MIN.) = 10.85
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 125.00 = 3277.00 FEET.

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

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

MAINLINE Tc (MIN.) = 10.85 **A-25**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.457
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.50	0.200	-
USER-DEFINED	-	1.20	0.50	0.100	-
USER-DEFINED	-	1.20	0.50	0.900	-

USER-DEFINED - 0.10 0.50 0.200 -
 USER-DEFINED - 1.60 0.50 0.100 -
 USER-DEFINED - 3.00 0.50 0.900 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.550
 SUBAREA AREA (ACRES) = 7.60 SUBAREA RUNOFF (CFS) = 8.09
 EFFECTIVE AREA (ACRES) = 65.90 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 65.9 PEAK FLOW RATE (CFS) = 72.07

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

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

MAINLINE Tc (MIN.) = 10.85 **A-25.1**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.457
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.90	0.50	0.200	-
USER-DEFINED	-	0.60	0.50	0.900	-
USER-DEFINED	-	0.30	0.50	0.600	-
USER-DEFINED	-	5.00	0.50	0.200	-
USER-DEFINED	-	2.30	0.50	0.850	-
USER-DEFINED	-	3.50	0.50	0.900	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
 SUBAREA AREA (ACRES) = 13.60 SUBAREA RUNOFF (CFS) = 14.60
 EFFECTIVE AREA (ACRES) = 79.50 AREA-AVERAGED Fm (INCH/HR) = 0.25
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 79.5 PEAK FLOW RATE (CFS) = 86.66

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

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

MAINLINE Tc (MIN.) = 10.85 **A-25.1**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.457
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	10.20	0.50	0.600	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA (ACRES) = 10.20 SUBAREA RUNOFF (CFS) = 10.62
 EFFECTIVE AREA (ACRES) = 89.70 AREA-AVERAGED Fm (INCH/HR) = 0.25
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.50
 TOTAL AREA (ACRES) = 89.7 PEAK FLOW RATE (CFS) = 97.29

 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 36.0 INCH PIPE IS 24.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.20
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 97.29
 PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 11.34
 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.) = 11.34
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.427 **A-26**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	5.90	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.100	-
USER-DEFINED	-	0.60	0.50	0.900	-
USER-DEFINED	-	6.00	0.50	0.200	-
USER-DEFINED	-	1.10	0.50	0.100	-
USER-DEFINED	-	4.70	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.395
 SUBAREA AREA(ACRES) = 18.40 SUBAREA RUNOFF(CFS) = 20.36
 EFFECTIVE AREA(ACRES) = 108.10 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 108.1 PEAK FLOW RATE(CFS) = 115.21

 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 42.0 INCH PIPE IS 31.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.11
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 115.21
 PIPE TRAVEL TIME(MIN.) = 0.67 Tc(MIN.) = 12.01
 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.) = 12.01
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.386 **A-27**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.50	0.50	0.100	-
USER-DEFINED	-	0.20	0.50	0.850	-

USER-DEFINED - 1.10 0.50 0.200 -
 USER-DEFINED - 12.70 0.50 0.100 -
 USER-DEFINED - 0.80 0.50 0.850 -
 USER-DEFINED - 4.10 0.50 0.900 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303
 SUBAREA AREA(ACRES) = 20.40 SUBAREA RUNOFF(CFS) = 22.66
 EFFECTIVE AREA(ACRES) = 128.50 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 128.5 PEAK FLOW RATE(CFS) = 133.83

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

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

MAINLINE Tc(MIN.) = 12.01
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.386 **A-27**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.20	0.50	0.100	-
USER-DEFINED	-	1.50	0.50	0.850	-
USER-DEFINED	-	0.10	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
 SUBAREA AREA(ACRES) = 2.80 SUBAREA RUNOFF(CFS) = 2.82
 EFFECTIVE AREA(ACRES) = 131.30 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 131.3 PEAK FLOW RATE(CFS) = 136.65

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

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

MAINLINE Tc(MIN.) = 12.01
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.386 **A-28**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.00	0.50	0.100	-
USER-DEFINED	-	1.30	0.50	0.100	-
USER-DEFINED	-	12.60	0.50	0.100	-
USER-DEFINED	-	1.10	0.50	0.850	-
USER-DEFINED	-	0.10	0.50	0.200	-
USER-DEFINED	-	2.10	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.238
 SUBAREA AREA(ACRES) = 18.20 SUBAREA RUNOFF(CFS) = 20.75
 EFFECTIVE AREA(ACRES) = 149.50 AREA-AVERAGED Fm(INCH/HR) = 0.22
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.43
 TOTAL AREA(ACRES) = 149.5 PEAK FLOW RATE(CFS) = 157.40

 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 39.0 INCH PIPE IS 27.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.95
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 157.40
PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 12.50
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.) = 12.50
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.355
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.20 0.50 0.100 -
USER-DEFINED - 0.40 0.50 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.223
SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 2.91
EFFECTIVE AREA(ACRES) = 152.10 AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 152.1 PEAK FLOW RATE(CFS) = 157.40
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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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.) = 12.50
RAINFALL INTENSITY(INCH/HR) = 1.35
AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.43
EFFECTIVE STREAM AREA(ACRES) = 152.10
TOTAL STREAM AREA(ACRES) = 152.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 157.40

** CONFLUENCE DATA **

Table with 8 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 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. Contains 3 rows of data.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 345.96 Tc(MIN.) = 12.50
EFFECTIVE AREA(ACRES) = 321.24 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.50 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 66.0 INCH PIPE IS 53.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.78
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 345.96
PIPE TRAVEL TIME(MIN.) = 1.48 Tc(MIN.) = 13.98
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.) = 13.98
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.263
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.60 0.50 0.100 -
USER-DEFINED - 0.60 0.50 0.900 -
USER-DEFINED - 1.80 0.50 0.100 -
USER-DEFINED - 1.40 0.50 0.900 -
USER-DEFINED - 0.80 0.50 0.100 -
USER-DEFINED - 1.60 0.50 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524
SUBAREA AREA(ACRES) = 6.80 SUBAREA RUNOFF(CFS) = 6.13
EFFECTIVE AREA(ACRES) = 328.04 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 386.2 PEAK FLOW RATE(CFS) = 345.96
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

A-30

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

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

MAINLINE Tc(MIN.) = 13.98
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.263
SUBAREA LOSS RATE DATA(AMC II):

A-31

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.50	0.50	0.100	-
USER-DEFINED	-	0.30	0.50	0.850	-
USER-DEFINED	-	0.10	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	1.50	0.50	0.600	-
USER-DEFINED	-	0.20	0.50	0.500	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.344
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 4.62
EFFECTIVE AREA(ACRES) = 332.74 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 390.9 PEAK FLOW RATE(CFS) = 345.96
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.) = 13.98
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.263
SUBAREA LOSS RATE DATA(AMC II):

A-31

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.90	0.50	0.400	-
USER-DEFINED	-	4.70	0.50	0.100	-
USER-DEFINED	-	1.30	0.50	0.850	-
USER-DEFINED	-	0.90	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	3.80	0.50	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.386
SUBAREA AREA(ACRES) = 13.70 SUBAREA RUNOFF(CFS) = 13.19
EFFECTIVE AREA(ACRES) = 346.44 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 404.6 PEAK FLOW RATE(CFS) = 345.96
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.) = 13.98
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.263
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.40	0.50	0.500	-
USER-DEFINED	-	0.70	0.50	0.400	-
USER-DEFINED	-	5.00	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.850	-
USER-DEFINED	-	10.30	0.50	0.200	-

USER-DEFINED - 0.10 0.50 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.253
SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 21.07
EFFECTIVE AREA(ACRES) = 367.04 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 425.2 PEAK FLOW RATE(CFS) = 357.19

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

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

MAINLINE Tc(MIN.) = 13.98
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.263

A-31

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.30	0.50	0.600	-
USER-DEFINED	-	3.90	0.50	0.500	-
USER-DEFINED	-	2.30	0.50	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.487
SUBAREA AREA(ACRES) = 7.50 SUBAREA RUNOFF(CFS) = 6.88
EFFECTIVE AREA(ACRES) = 374.54 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 432.7 PEAK FLOW RATE(CFS) = 364.07

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 60.0 INCH PIPE IS 45.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.68
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 364.07
PIPE TRAVEL TIME(MIN.) = 1.31 Tc(MIN.) = 15.30
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.) = 15.30
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.189

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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
USER-DEFINED	-	1.30	0.50	0.100	-
USER-DEFINED	-	1.20	0.50	0.900	-
USER-DEFINED	-	0.10	0.50	0.600	-
USER-DEFINED	-	1.30	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.850	-

USER-DEFINED - 3.00 0.50 0.900 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.598
 SUBAREA AREA (ACRES) = 7.00 SUBAREA RUNOFF (CFS) = 5.61
 EFFECTIVE AREA (ACRES) = 381.54 AREA-AVERAGED Fm (INCH/HR) = 0.19
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.37
 TOTAL AREA (ACRES) = 439.7 PEAK FLOW RATE (CFS) = 364.07
 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.) = 15.30
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.189 **A-32**
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.50	0.50	0.600	-
USER-DEFINED	-	0.80	0.50	0.100	-
USER-DEFINED	-	1.30	0.50	0.900	-
USER-DEFINED	-	3.30	0.50	0.600	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.598
 SUBAREA AREA (ACRES) = 7.90 SUBAREA RUNOFF (CFS) = 6.33
 EFFECTIVE AREA (ACRES) = 389.44 AREA-AVERAGED Fm (INCH/HR) = 0.19
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.37
 TOTAL AREA (ACRES) = 447.6 PEAK FLOW RATE (CFS) = 364.07
 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
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.602 **OA-4**
 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"	-	1.50	0.50	1.000	75	9.31
NATURAL FAIR COVER "WOODLAND, GRASS"	-	0.40	0.50	1.000	75	9.31

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF (CFS) = 1.88
 TOTAL AREA (ACRES) = 1.90 PEAK FLOW RATE (CFS) = 1.88

 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
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.464 **OA-5**

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.90	0.50	1.000	-
USER-DEFINED	-	2.40	0.50	1.000	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 5.06
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.93
 AVERAGE FLOW DEPTH (FEET) = 0.58 TRAVEL TIME (MIN.) = 1.42
 Tc (MIN.) = 10.74
 SUBAREA AREA (ACRES) = 7.30 SUBAREA RUNOFF (CFS) = 6.33
 EFFECTIVE AREA (ACRES) = 9.20 AREA-AVERAGED Fm (INCH/HR) = 0.50
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 9.2 PEAK FLOW RATE (CFS) = 7.98

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.70 FLOW VELOCITY (FEET/SEC.) = 5.48
 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 18.0 INCH PIPE IS 13.3 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 5.70
 ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 7.98
 PIPE TRAVEL TIME (MIN.) = 1.46 Tc (MIN.) = 12.20
 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.) = 12.20
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.374
 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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OA-6

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	5.10	0.50	1.000	-
USER-DEFINED	-	4.00	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 7.15
EFFECTIVE AREA (ACRES) = 18.30 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 18.3 PEAK FLOW RATE (CFS) = 14.38

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 30.0 INCH PIPE IS 24.2 INCHES	
PIPE-FLOW VELOCITY (FEET/SEC.) = 3.39	
ESTIMATED PIPE DIAMETER (INCH) = 30.00	NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 14.38	
PIPE TRAVEL TIME (MIN.) = 3.50	Tc (MIN.) = 15.70
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.) = 15.70
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.175

OA-7

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.30	0.50	1.000	-
USER-DEFINED	-	5.70	0.50	1.000	-
USER-DEFINED	-	3.40	0.50	1.000	-
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	2.10	0.50	1.000	-
USER-DEFINED	-	1.60	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 13.20 SUBAREA RUNOFF (CFS) = 8.02
EFFECTIVE AREA (ACRES) = 31.50 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 31.5 PEAK FLOW RATE (CFS) = 19.13

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

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

MAINLINE Tc (MIN.) = 15.70
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.175

OA-7

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
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USER-DEFINED	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	0.20	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF (CFS) = 0.12
EFFECTIVE AREA (ACRES) = 31.70 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 31.7 PEAK FLOW RATE (CFS) = 19.25

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 33.0 INCH PIPE IS 22.7 INCHES	
PIPE-FLOW VELOCITY (FEET/SEC.) = 4.42	
ESTIMATED PIPE DIAMETER (INCH) = 33.00	NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 19.25	
PIPE TRAVEL TIME (MIN.) = 3.43	Tc (MIN.) = 19.13
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 155.00 = 2873.00 FEET.	

FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 19.13
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.051

OA-8

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.60	0.50	1.000	-
USER-DEFINED	-	1.60	0.50	1.000	-
USER-DEFINED	-	1.80	0.50	1.000	-
USER-DEFINED	-	1.50	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 6.50 SUBAREA RUNOFF (CFS) = 3.22
EFFECTIVE AREA (ACRES) = 38.20 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 38.2 PEAK FLOW RATE (CFS) = 19.25
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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 21.0 INCH PIPE IS 14.6 INCHES	
PIPE-FLOW VELOCITY (FEET/SEC.) = 10.79	
ESTIMATED PIPE DIAMETER (INCH) = 21.00	NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 19.25	
PIPE TRAVEL TIME (MIN.) = 1.23	Tc (MIN.) = 20.36

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.) = 20.36

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.011

OA-9

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.90	0.50	1.000	-
USER-DEFINED	-	0.40	0.50	1.000	-
USER-DEFINED	-	1.30	0.50	1.000	-
USER-DEFINED	-	4.50	0.50	1.000	-
USER-DEFINED	-	1.30	0.50	1.000	-
USER-DEFINED	-	3.70	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA AREA(ACRES) = 13.10 SUBAREA RUNOFF(CFS) = 6.03

EFFECTIVE AREA(ACRES) = 51.30 AREA-AVERAGED Fm(INCH/HR) = 0.50

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 51.3 PEAK FLOW RATE(CFS) = 23.60

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 21.0 INCH PIPE IS 15.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 12.65

ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 23.60

PIPE TRAVEL TIME(MIN.) = 8.16 Tc(MIN.) = 28.52

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 (ACRES)	Ae (ACRES)	HEADWATER NODE
1	23.60	28.52	0.851	0.50(0.50)	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 (ACRES)	Ae (ACRES)	HEADWATER NODE
1	364.07	15.30	1.189	0.50(0.19)	0.37	389.4	120.00
2	360.51	15.76	1.173	0.50(0.19)	0.37	395.7	110.00
3	308.35	23.64	0.933	0.50(0.18)	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	387.68	15.30	1.189	0.50(0.21)	0.42	417.0	120.00
2	384.11	15.76	1.173	0.50(0.21)	0.42	424.0	110.00
3	331.96	23.64	0.933	0.50(0.21)	0.41	490.1	100.00
4	298.47	28.52	0.851	0.50(0.21)	0.42	498.9	150.00

TOTAL AREA(ACRES) = 498.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 387.68 Tc(MIN.) = 15.297

EFFECTIVE AREA(ACRES) = 416.95 AREA-AVERAGED Fm(INCH/HR) = 0.21

AREA-AVERAGED Fp(INCH/HR) = 0.50 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.) = 15.30

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.189

A-33

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.60	0.50	1.000	-
USER-DEFINED	-	1.30	0.50	1.000	-
USER-DEFINED	-	2.60	0.50	0.900	-
USER-DEFINED	-	1.90	0.50	1.000	-
USER-DEFINED	-	0.70	0.50	1.000	-
USER-DEFINED	-	0.80	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.971

SUBAREA AREA(ACRES) = 8.90 SUBAREA RUNOFF(CFS) = 5.64

EFFECTIVE AREA(ACRES) = 425.85 AREA-AVERAGED Fm(INCH/HR) = 0.21

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.43

TOTAL AREA(ACRES) = 507.8 PEAK FLOW RATE(CFS) = 387.68

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.) = 15.30

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.189

A-33

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.850	-
USER-DEFINED	-	1.50	0.50	0.900	-
USER-DEFINED	-	0.40	0.50	1.000	-
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.30	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.919$
 SUBAREA AREA (ACRES) = 2.40 SUBAREA RUNOFF (CFS) = 1.58
 EFFECTIVE AREA (ACRES) = 428.25 AREA-AVERAGED F_m (INCH/HR) = 0.22
 AREA-AVERAGED F_p (INCH/HR) = 0.50 AREA-AVERAGED $A_p = 0.43$
 TOTAL AREA (ACRES) = 510.2 PEAK FLOW RATE (CFS) = 387.68
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 510.2 TC (MIN.) = 15.30
 EFFECTIVE AREA (ACRES) = 428.25 AREA-AVERAGED F_m (INCH/HR) = 0.22
 AREA-AVERAGED F_p (INCH/HR) = 0.50 AREA-AVERAGED $A_p = 0.430$
 PEAK FLOW RATE (CFS) = 387.68

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	387.68	15.30	1.189	0.50 (0.22)	0.43	428.3	120.00
2	384.11	15.76	1.173	0.50 (0.21)	0.43	435.3	110.00
3	331.96	23.64	0.933	0.50 (0.21)	0.42	501.4	100.00
4	298.47	28.52	0.851	0.50 (0.22)	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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Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA A ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 10-YR EV AUGUST 2018 CCHU *

FILE NAME: PA3A10EV.DAT
TIME/DATE OF STUDY: 12:00 08/15/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 5.00
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)	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:

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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.232
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"	B	1.10	0.30	1.000	66	9.41

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.91
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 1.91

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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.075

OA-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 "CHAPARRAL,BROADLEAF"	B	0.90	0.30	1.000	63
NATURAL FAIR COVER "OPEN BRUSH"	B	2.60	0.30	1.000	66
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.983
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.28
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.93
AVERAGE FLOW DEPTH(FEET) = 0.60 TRAVEL TIME(MIN.) = 1.30
Tc(MIN.) = 10.72
SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 6.73
EFFECTIVE AREA(ACRES) = 5.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
TOTAL AREA(ACRES) = 5.3 PEAK FLOW RATE(CFS) = 8.49

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.71 FLOW VELOCITY(FEET/SEC.) = 5.57
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) = 10.23
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.72
AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.86
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.87
STREET FLOW TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 11.47
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.998

A-1

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	1.10	0.30	0.900	56
COMMERCIAL	B	1.00	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.519
SUBAREA AREA(ACRES) = 2.10 SUBAREA RUNOFF(CFS) = 3.48
EFFECTIVE AREA(ACRES) = 7.40 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 7.4 PEAK FLOW RATE(CFS) = 11.60

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 9.28
FLOW VELOCITY(FEET/SEC.) = 6.02 DEPTH*VELOCITY(FT*FT/SEC.) = 1.98
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) = 19.43
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41

HALFSTREET FLOOD WIDTH(FEET) = 13.71
AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.19
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.11
STREET FLOW TRAVEL TIME(MIN.) = 1.59 Tc(MIN.) = 13.05
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.858

A-2

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	B	6.60	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.80	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.271
SUBAREA AREA(ACRES) = 9.80 SUBAREA RUNOFF(CFS) = 15.67
EFFECTIVE AREA(ACRES) = 17.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 26.33

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.59
FLOW VELOCITY(FEET/SEC.) = 5.57 DEPTH*VELOCITY(FT*FT/SEC.) = 2.46
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 24.0 INCH PIPE IS 14.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.87
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.33
PIPE TRAVEL TIME(MIN.) = 1.89 Tc(MIN.) = 14.94
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.) = 14.94
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.722
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	B	3.90	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.90	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.255

A-3

SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 8.29
EFFECTIVE AREA (ACRES) = 22.80 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 22.8 PEAK FLOW RATE (CFS) = 32.52

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

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

MAINLINE Tc (MIN.) = 14.94
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.722 **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 B 5.00 0.30 0.100 56
PUBLIC PARK B 2.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA (ACRES) = 9.20 SUBAREA RUNOFF (CFS) = 13.26
EFFECTIVE AREA (ACRES) = 32.00 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
TOTAL AREA (ACRES) = 32.0 PEAK FLOW RATE (CFS) = 45.79

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

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

MAINLINE Tc (MIN.) = 14.94
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.722 **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 1.80 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 2.74
EFFECTIVE AREA (ACRES) = 33.80 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
TOTAL AREA (ACRES) = 33.8 PEAK FLOW RATE (CFS) = 48.53

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 30.0 INCH PIPE IS 21.4 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 12.96

ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 48.53
PIPE TRAVEL TIME (MIN.) = 1.03 Tc (MIN.) = 15.97
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.) = 15.97
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.658 **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 B 7.60 0.30 0.100 56
PUBLIC PARK B 0.40 0.30 0.850 56
COMMERCIAL B 10.50 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.125
SUBAREA AREA (ACRES) = 21.60 SUBAREA RUNOFF (CFS) = 31.51
EFFECTIVE AREA (ACRES) = 55.40 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
TOTAL AREA (ACRES) = 55.4 PEAK FLOW RATE (CFS) = 78.10

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

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

MAINLINE Tc (MIN.) = 15.97
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.658 **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 B 12.10 0.30 0.100 56
PUBLIC PARK B 1.00 0.30 0.850 56
COMMERCIAL B 4.50 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.131
SUBAREA AREA (ACRES) = 24.40 SUBAREA RUNOFF (CFS) = 35.56
EFFECTIVE AREA (ACRES) = 79.80 AREA-AVERAGED Fm (INCH/HR) = 0.08
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.25
TOTAL AREA (ACRES) = 79.8 PEAK FLOW RATE (CFS) = 113.66

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 39.0 INCH PIPE IS 31.0 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 16.06
 ESTIMATED PIPE DIAMETER (INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 113.66
 PIPE TRAVEL TIME (MIN.) = 0.84 Tc (MIN.) = 16.81
 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.) = 16.81
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.611 **A-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	3.40	0.30	0.100	56
COMMERCIAL	B	6.70	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
COMMERCIAL	B	2.50	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.106
 SUBAREA AREA (ACRES) = 12.70 SUBAREA RUNOFF (CFS) = 18.05
 EFFECTIVE AREA (ACRES) = 92.50 AREA-AVERAGED Fm (INCH/HR) = 0.07
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.23
 TOTAL AREA (ACRES) = 92.5 PEAK FLOW RATE (CFS) = 128.34

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

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

MAINLINE Tc (MIN.) = 16.81
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.611 **A-7**
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	7.20	0.30	0.100	56
PUBLIC PARK	B	0.70	0.30	0.850	56
COMMERCIAL	B	7.60	0.30	0.100	56
PUBLIC PARK	B	0.30	0.30	0.850	56
COMMERCIAL	B	4.70	0.30	0.100	56
PUBLIC PARK	B	0.40	0.30	0.850	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.150
 SUBAREA AREA (ACRES) = 20.90 SUBAREA RUNOFF (CFS) = 29.46
 EFFECTIVE AREA (ACRES) = 113.40 AREA-AVERAGED Fm (INCH/HR) = 0.07
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
 TOTAL AREA (ACRES) = 113.4 PEAK FLOW RATE (CFS) = 157.80

 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 60.0 INCH PIPE IS 43.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 10.38
 ESTIMATED PIPE DIAMETER (INCH) = 60.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 157.80
 PIPE TRAVEL TIME (MIN.) = 1.50 Tc (MIN.) = 18.31
 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.) = 18.31
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.536 **A-18**
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.50	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
COMMERCIAL	B	2.80	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.80	0.30	0.900	56
COMMERCIAL	B	0.60	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.235
 SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 10.95
 EFFECTIVE AREA (ACRES) = 121.70 AREA-AVERAGED Fm (INCH/HR) = 0.07
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
 TOTAL AREA (ACRES) = 121.7 PEAK FLOW RATE (CFS) = 161.04

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

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

MAINLINE Tc (MIN.) = 18.31
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.536 **A-9**
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	0.40	0.30	0.200	56
APARTMENTS	B	5.50	0.30	0.200	56
APARTMENTS	B	3.20	0.30	0.200	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 12.09
 EFFECTIVE AREA (ACRES) = 130.80 AREA-AVERAGED Fm (INCH/HR) = 0.07
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
 TOTAL AREA (ACRES) = 130.8 PEAK FLOW RATE (CFS) = 173.13

 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.) = 18.31
 RAINFALL INTENSITY(INCH/HR) = 1.54
 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.22
 EFFECTIVE STREAM AREA(ACRES) = 130.80
 TOTAL STREAM AREA(ACRES) = 130.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 173.13

 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 Tc(MIN.) = 5.417
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 3.045
 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"	B	0.40	0.30	0.900	56	8.68
COMMERCIAL	B	0.30	0.30	0.100	56	5.42
PUBLIC PARK	B	1.30	0.30	0.850	56	8.61
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	1.00	0.30	0.900	56	8.68

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.798
 SUBAREA RUNOFF(CFS) = 7.57
 TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 7.57

A-10

 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) = 12.08
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.34
 HALFSTREET FLOOD WIDTH(FEET) = 10.20

AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.38
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.85
 STREET FLOW TRAVEL TIME(MIN.) = 1.60 Tc(MIN.) = 7.02
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.633

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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	B	2.30	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
COMMERCIAL	B	1.00	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.223
 SUBAREA AREA(ACRES) = 3.90 SUBAREA RUNOFF(CFS) = 9.01
 EFFECTIVE AREA(ACRES) = 6.90 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 15.47

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.45
 FLOW VELOCITY(FEET/SEC.) = 5.67 DEPTH*VELOCITY(FT*FT/SEC.) = 2.08
 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) = 24.17

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.46
 HALFSTREET FLOOD WIDTH(FEET) = 16.52
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.59
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.10
 STREET FLOW TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 8.43

A-12

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.375
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	5.00	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.20	0.30	0.900	56

COMMERCIAL B 1.00 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335
 SUBAREA AREA (ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 17.40
 EFFECTIVE AREA(ACRES) = 15.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
 TOTAL AREA(ACRES) = 15.4 PEAK FLOW RATE(CFS) = 31.27

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 18.40
 FLOW VELOCITY(FEET/SEC.) = 4.86 DEPTH*VELOCITY(FT*FT/SEC.) = 2.39
 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 24.0 INCH PIPE IS 17.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.97
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 31.27
 PIPE TRAVEL TIME(MIN.) = 0.90 Tc(MIN.) = 9.33
 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.) = 9.33
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.243

A-13

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 1.60 0.30 0.100 56
 PUBLIC PARK B 0.20 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.10 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455
 SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 5.50
 EFFECTIVE AREA(ACRES) = 18.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 18.3 PEAK FLOW RATE(CFS) = 34.94

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

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

MAINLINE Tc(MIN.) = 9.33
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.243

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 9.00 0.30 0.100 56
 PUBLIC PARK B 1.90 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.70 0.30 0.900 56
 COMMERCIAL B 4.10 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313
 SUBAREA AREA(ACRES) = 18.00 SUBAREA RUNOFF(CFS) = 34.82
 EFFECTIVE AREA(ACRES) = 36.30 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
 TOTAL AREA(ACRES) = 36.3 PEAK FLOW RATE(CFS) = 69.76

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.) = 9.33
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.243

A-15

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 4.50 0.30 0.100 56
 PUBLIC PARK B 1.20 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 3.80 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.515
 SUBAREA AREA(ACRES) = 9.50 SUBAREA RUNOFF(CFS) = 17.86
 EFFECTIVE AREA(ACRES) = 45.80 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 45.8 PEAK FLOW RATE(CFS) = 87.61

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

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

MAINLINE Tc(MIN.) = 9.33
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.243

OA-3

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" B 5.30 0.30 1.000 66
 NATURAL FAIR COVER
 "WOODLAND, GRASS" B 0.30 0.30 1.000 65
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 9.79
 EFFECTIVE AREA(ACRES) = 51.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 51.4 PEAK FLOW RATE(CFS) = 97.41

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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 36.0 INCH PIPE IS 26.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.39
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 97.41
PIPE TRAVEL TIME(MIN.) = 0.97 Tc(MIN.) = 10.31
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.) = 10.31
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.121
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 B 11.00 0.30 0.100 56
PUBLIC PARK B 1.80 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.50 0.30 0.900 56
COMMERCIAL B 3.20 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.222
SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 38.65
EFFECTIVE AREA(ACRES) = 72.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 72.3 PEAK FLOW RATE(CFS) = 130.42

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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 36.0 INCH PIPE IS 27.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.62
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 130.42
PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 11.12
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.) = 11.12
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.032
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 B 5.10 0.30 0.100 56
PUBLIC PARK B 1.90 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.60 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.485
SUBAREA AREA(ACRES) = 16.20 SUBAREA RUNOFF(CFS) = 27.51
EFFECTIVE AREA(ACRES) = 88.50 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 88.5 PEAK FLOW RATE(CFS) = 152.13

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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<<<<
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MAINLINE Tc(MIN.) = 11.12
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.032
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 2.70 0.30 0.100 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.50 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 5.82
EFFECTIVE AREA(ACRES) = 91.80 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 91.8 PEAK FLOW RATE(CFS) = 157.95

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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.) = 11.12
RAINFALL INTENSITY(INCH/HR) = 2.03
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.40
EFFECTIVE STREAM AREA(ACRES) = 91.80
TOTAL STREAM AREA(ACRES) = 91.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 157.95

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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	173.13	18.31	1.536	0.30 (0.07)	0.22	130.8	100.00
2	157.95	11.12	2.032	0.30 (0.12)	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	298.64	11.12	2.032	0.30 (0.09)	0.32	171.3	110.00
2	290.07	18.31	1.536	0.30 (0.09)	0.29	222.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 298.64 Tc (MIN.) = 11.12
EFFECTIVE AREA (ACRES) = 171.27 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30 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 69.0 INCH PIPE IS 53.4 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 13.86
ESTIMATED PIPE DIAMETER (INCH) = 69.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 298.64
PIPE TRAVEL TIME (MIN.) = 1.08 Tc (MIN.) = 12.21
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.) = 12.21
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.929

A-19

DEVELOPMENT TYPE/ SCs SOIL AREA Fp Ap SCs
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL	B	1.10	0.30	0.100	56
COMMERCIAL	B	3.60	0.30	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 8.03
EFFECTIVE AREA (ACRES) = 175.97 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
TOTAL AREA (ACRES) = 227.3 PEAK FLOW RATE (CFS) = 298.64
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.) = 12.21
RAINFALL INTENSITY (INCH/HR) = 1.93
AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA (ACRES) = 175.97
TOTAL STREAM AREA (ACRES) = 227.30
PEAK FLOW RATE (CFS) AT CONFLUENCE = 298.64

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.662
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	B	0.50	0.30	0.100	56	6.88
PUBLIC PARK	B	0.20	0.30	0.850	56	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	B	2.70	0.30	0.200	56	7.33
RESIDENTIAL						
".4 DWELLING/ACRE"	B	1.40	0.30	0.900	56	11.02
PUBLIC PARK	B	0.10	0.30	0.850	56	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	B	1.30	0.30	0.200	56	7.33

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.381
SUBAREA RUNOFF (CFS) = 14.22
TOTAL AREA (ACRES) = 6.20 PEAK FLOW RATE (CFS) = 14.22

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.662

A-20

DEVELOPMENT TYPE/ SCs SOIL AREA Fp Ap SCs
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

RESIDENTIAL						
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56	

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF (CFS) = 0.43
 EFFECTIVE AREA (ACRES) = 6.40 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
 TOTAL AREA (ACRES) = 6.4 PEAK FLOW RATE (CFS) = 14.65

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 21.0 INCH PIPE IS 13.1 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 9.31
 ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 14.65
 PIPE TRAVEL TIME (MIN.) = 0.76 Tc (MIN.) = 7.64
 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.) = 7.64
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.510

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"	B	5.40	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.40	0.30	0.900	56
COMMERCIAL	B	0.70	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.60	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.423
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 19.52
 EFFECTIVE AREA (ACRES) = 15.50 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA (ACRES) = 15.5 PEAK FLOW RATE (CFS) = 33.29

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 27.0 INCH PIPE IS 18.5 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 11.47
 ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 33.29
 PIPE TRAVEL TIME (MIN.) = 1.50 Tc (MIN.) = 9.14

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.) = 9.14
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.270

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	B	7.60	0.30	0.200	56
COMMERCIAL	B	1.40	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.30	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	6.50	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	8.40	0.30	0.600	56
APARTMENTS	B	0.50	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.491
 SUBAREA AREA (ACRES) = 26.70 SUBAREA RUNOFF (CFS) = 51.01
 EFFECTIVE AREA (ACRES) = 42.20 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 42.2 PEAK FLOW RATE (CFS) = 80.94

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

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

MAINLINE Tc (MIN.) = 9.14
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.270

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	B	0.30	0.30	0.100	56
PUBLIC PARK	B	1.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.00	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	3.80	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.80	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.642
 SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF (CFS) = 20.56
 EFFECTIVE AREA (ACRES) = 53.20 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA (ACRES) = 53.2 PEAK FLOW RATE (CFS) = 101.51

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 45.0 INCH PIPE IS 34.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.20
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 101.51
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 9.47
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.) = 9.47
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.225
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 1.60 0.30 0.100 56
PUBLIC PARK B 0.20 0.30 0.850 56
APARTMENTS B 0.30 0.30 0.200 56
COMMERCIAL B 2.10 0.30 0.100 56
PUBLIC PARK B 0.60 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.231
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 9.51
EFFECTIVE AREA(ACRES) = 58.10 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 58.1 PEAK FLOW RATE(CFS) = 108.87

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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.) = 9.47
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.225
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 0.20 0.30 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.39
EFFECTIVE AREA(ACRES) = 58.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 58.3 PEAK FLOW RATE(CFS) = 109.26

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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 36.0 INCH PIPE IS 24.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.28
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 109.26
PIPE TRAVEL TIME(MIN.) = 1.00 Tc(MIN.) = 10.46
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.) = 10.46
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.103
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 0.50 0.30 0.200 56
COMMERCIAL B 1.20 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.20 0.30 0.900 56
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 1.60 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.00 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.550
SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 13.26
EFFECTIVE AREA(ACRES) = 65.90 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 65.9 PEAK FLOW RATE(CFS) = 116.14

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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.) = 10.46
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.103
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 1.90 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.60 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.30 0.30 0.600 56
APARTMENTS B 5.00 0.30 0.200 56
PUBLIC PARK B 2.30 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.50 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 23.80
EFFECTIVE AREA(ACRES) = 79.50 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49

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A-25.1

TOTAL AREA (ACRES) = 79.5 PEAK FLOW RATE (CFS) = 139.94

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

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

MAINLINE Tc (MIN.) = 10.46

A-25.1

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.103

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	10.20	0.30	0.600	56

RESIDENTIAL

"3-4 DWELLINGS/ACRE" B 10.20 0.30 0.600 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600

SUBAREA AREA (ACRES) = 10.20 SUBAREA RUNOFF (CFS) = 17.66

EFFECTIVE AREA (ACRES) = 89.70 AREA-AVERAGED Fm (INCH/HR) = 0.15

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50

TOTAL AREA (ACRES) = 89.7 PEAK FLOW RATE (CFS) = 157.60

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 42.0 INCH PIPE IS 29.9 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 21.54

ESTIMATED PIPE DIAMETER (INCH) = 42.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 157.60

PIPE TRAVEL TIME (MIN.) = 0.43 Tc (MIN.) = 10.90

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.) = 10.90

A-26

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.056

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	5.90	0.30	0.200	56
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
APARTMENTS	B	6.00	0.30	0.200	56
COMMERCIAL	B	1.10	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	4.70	0.30	0.900	56

RESIDENTIAL

"4 DWELLING/ACRE" B 0.60 0.30 0.900 56

APARTMENTS B 6.00 0.30 0.200 56

COMMERCIAL B 1.10 0.30 0.100 56

RESIDENTIAL

"4 DWELLING/ACRE" B 4.70 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.395

SUBAREA AREA (ACRES) = 18.40 SUBAREA RUNOFF (CFS) = 32.08

EFFECTIVE AREA (ACRES) = 108.10 AREA-AVERAGED Fm (INCH/HR) = 0.15

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49

TOTAL AREA (ACRES) = 108.1 PEAK FLOW RATE (CFS) = 185.84

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 51.0 INCH PIPE IS 36.5 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 17.10

ESTIMATED PIPE DIAMETER (INCH) = 51.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 185.84

PIPE TRAVEL TIME (MIN.) = 0.59 Tc (MIN.) = 11.49

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.) = 11.49

A-27

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.996

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	B	1.10	0.30	0.200	56
COMMERCIAL	B	12.70	0.30	0.100	56
PUBLIC PARK	B	0.80	0.30	0.850	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	4.10	0.30	0.900	56

COMMERCIAL

PUBLIC PARK

APARTMENTS

COMMERCIAL

PUBLIC PARK

RESIDENTIAL

"4 DWELLING/ACRE" B 4.10 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303

SUBAREA AREA (ACRES) = 20.40 SUBAREA RUNOFF (CFS) = 34.97

EFFECTIVE AREA (ACRES) = 128.50 AREA-AVERAGED Fm (INCH/HR) = 0.14

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46

TOTAL AREA (ACRES) = 128.5 PEAK FLOW RATE (CFS) = 214.95

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

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

MAINLINE Tc (MIN.) = 11.49

A-27

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.996

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.20	0.30	0.100	56
PUBLIC PARK	B	1.50	0.30	0.850	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

COMMERCIAL

PUBLIC PARK

RESIDENTIAL

"4 DWELLING/ACRE" B 0.10 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530

SUBAREA AREA (ACRES) = 2.80 SUBAREA RUNOFF (CFS) = 4.63
EFFECTIVE AREA (ACRES) = 131.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 131.3 PEAK FLOW RATE (CFS) = 219.58

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

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

=====

MAINLINE Tc (MIN.) = 11.49
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.996 **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 B 1.30 0.30 0.100 56
COMMERCIAL B 12.60 0.30 0.100 56
PUBLIC PARK B 1.10 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.10 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.238
SUBAREA AREA (ACRES) = 18.20 SUBAREA RUNOFF (CFS) = 31.52
EFFECTIVE AREA (ACRES) = 149.50 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
TOTAL AREA (ACRES) = 149.5 PEAK FLOW RATE (CFS) = 251.10

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 45.0 INCH PIPE IS 34.4 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 27.75
ESTIMATED PIPE DIAMETER (INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 251.10
PIPE TRAVEL TIME (MIN.) = 0.44 Tc (MIN.) = 11.93
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.) = 11.93
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.954 **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 B 2.20 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.40 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.223
SUBAREA AREA (ACRES) = 2.60 SUBAREA RUNOFF (CFS) = 4.41
EFFECTIVE AREA (ACRES) = 152.10 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
TOTAL AREA (ACRES) = 152.1 PEAK FLOW RATE (CFS) = 251.10
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.) = 11.93
RAINFALL INTENSITY (INCH/HR) = 1.95
AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.43
EFFECTIVE STREAM AREA (ACRES) = 152.10
TOTAL STREAM AREA (ACRES) = 152.10
PEAK FLOW RATE (CFS) AT CONFLUENCE = 251.10

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	298.64	12.21	1.929	0.30 (0.09)	0.31	176.0	110.00
1	290.07	19.40	1.487	0.30 (0.09)	0.29	227.3	100.00
2	251.10	11.93	1.954	0.30 (0.13)	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	546.99	11.93	1.954	0.30 (0.11)	0.37	324.1	120.00
2	546.35	12.21	1.929	0.30 (0.11)	0.36	328.1	110.00
3	476.98	19.40	1.487	0.30 (0.10)	0.34	379.4	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 546.99 Tc (MIN.) = 11.93
EFFECTIVE AREA (ACRES) = 324.14 AREA-AVERAGED Fm (INCH/HR) = 0.11
AREA-AVERAGED Fp (INCH/HR) = 0.30 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 81.0 INCH PIPE IS 60.4 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 19.11
 ESTIMATED PIPE DIAMETER (INCH) = 81.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 546.99
 PIPE TRAVEL TIME (MIN.) = 1.30 Tc (MIN.) = 13.24
 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.) = 13.24 **A-30**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.843
 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	B	1.80	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	1.40	0.30	0.900	56
COMMERCIAL	B	0.80	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	1.60	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.524
 SUBAREA AREA (ACRES) = 6.80 SUBAREA RUNOFF (CFS) = 10.32
 EFFECTIVE AREA (ACRES) = 330.94 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA (ACRES) = 386.2 PEAK FLOW RATE (CFS) = 546.99
 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.) = 13.24 **A-31**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.843
 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) = 7.36
 EFFECTIVE AREA (ACRES) = 335.64 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37

TOTAL AREA (ACRES) = 390.9 PEAK FLOW RATE (CFS) = 546.99
 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.) = 13.24 **A-31**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.843
 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	B	4.70	0.30	0.100	56
PUBLIC PARK	B	1.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.90	0.30	0.200	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.80	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.386
 SUBAREA AREA (ACRES) = 13.70 SUBAREA RUNOFF (CFS) = 21.30
 EFFECTIVE AREA (ACRES) = 349.34 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA (ACRES) = 404.6 PEAK FLOW RATE (CFS) = 546.99
 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.) = 13.24 **A-31**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.843
 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"	B	4.40	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.70	0.30	0.400	56
COMMERCIAL	B	5.00	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	10.30	0.30	0.200	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.253
 SUBAREA AREA (ACRES) = 20.60 SUBAREA RUNOFF (CFS) = 32.76
 EFFECTIVE AREA (ACRES) = 369.94 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
 TOTAL AREA (ACRES) = 425.2 PEAK FLOW RATE (CFS) = 577.40

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

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

MAINLINE Tc(MIN.) = 13.24
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.843

A-31

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" B 1.30 0.30 0.600 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 3.90 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 2.30 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.487
SUBAREA AREA(ACRES) = 7.50 SUBAREA RUNOFF(CFS) = 11.45
EFFECTIVE AREA(ACRES) = 377.44 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 432.7 PEAK FLOW RATE(CFS) = 588.85

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 72.0 INCH PIPE IS 54.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.60
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 588.85
PIPE TRAVEL TIME(MIN.) = 1.16 Tc(MIN.) = 14.40
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.) = 14.40
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.758

A-32

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.30 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 B 1.30 0.30 0.100 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.00 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.598
SUBAREA AREA(ACRES) = 7.00 SUBAREA RUNOFF(CFS) = 9.94
EFFECTIVE AREA(ACRES) = 384.44 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 439.7 PEAK FLOW RATE(CFS) = 588.85
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.) = 14.40
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.758

A-32

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" B 2.50 0.30 0.600 56
COMMERCIAL B 0.80 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.30 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.30 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.599
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 11.22
EFFECTIVE AREA(ACRES) = 392.34 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 447.6 PEAK FLOW RATE(CFS) = 588.85
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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.246
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
"OPEN BRUSH" B 1.50 0.30 1.000 66 9.31
NATURAL FAIR COVER
"WOODLAND, GRASS" B 0.40 0.30 1.000 65 9.31
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

OA-4

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 3.33
TOTAL AREA (ACRES) = 1.90 PEAK FLOW RATE (CFS) = 3.33

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

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.094

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"	B	4.90	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND,GRASS"	B	2.40	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.23
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.69
AVERAGE FLOW DEPTH(FEET) = 0.74 TRAVEL TIME(MIN.) = 1.23
Tc(MIN.) = 10.55
SUBAREA AREA(ACRES) = 7.30 SUBAREA RUNOFF(CFS) = 11.79
EFFECTIVE AREA(ACRES) = 9.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 9.2 PEAK FLOW RATE(CFS) = 14.86

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.88 FLOW VELOCITY(FEET/SEC.) = 6.39
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	24.0 INCH PIPE IS	15.9 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	6.74		
ESTIMATED PIPE DIAMETER(INCH) =	24.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	14.86		
PIPE TRAVEL TIME(MIN.) =	1.24	Tc(MIN.) =	11.78

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.) = 11.78

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.967
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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OA-6

NATURAL FAIR COVER "OPEN BRUSH"	B	5.10	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND,GRASS"	B	4.00	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 13.66
EFFECTIVE AREA(ACRES) = 18.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 18.3 PEAK FLOW RATE(CFS) = 27.46

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	39.0 INCH PIPE IS	29.9 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	4.02		
ESTIMATED PIPE DIAMETER(INCH) =	39.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	27.46		
PIPE TRAVEL TIME(MIN.) =	2.94	Tc(MIN.) =	14.73

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.) = 14.73

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.736
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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OA-7

NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	B	0.30	0.30	1.000	63
NATURAL FAIR COVER "CHAPARRAL,NARROWLEAF"	B	5.70	0.30	1.000	72
NATURAL FAIR COVER "OPEN BRUSH"	B	3.40	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND,GRASS"	B	0.10	0.30	1.000	65
NATURAL FAIR COVER "CHAPARRAL,NARROWLEAF"	B	2.10	0.30	1.000	72
NATURAL FAIR COVER "OPEN BRUSH"	B	1.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 13.20 SUBAREA RUNOFF(CFS) = 17.05
EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 40.70

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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.) = 14.73
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.736
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" B 0.20 0.30 1.000 65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.26
EFFECTIVE AREA(ACRES) = 31.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.7 PEAK FLOW RATE(CFS) = 40.96
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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 42.0 INCH PIPE IS 31.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.27
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.96
PIPE TRAVEL TIME(MIN.) = 2.88 Tc(MIN.) = 17.61
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.) = 17.61
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.570
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 1.60 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 1.60 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 1.80 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 1.50 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 6.50 SUBAREA RUNOFF(CFS) = 7.43
EFFECTIVE AREA(ACRES) = 38.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
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OA-8

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TOTAL AREA(ACRES) = 38.2 PEAK FLOW RATE(CFS) = 43.66
*****
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 27.0 INCH PIPE IS 21.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.00
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 43.66
PIPE TRAVEL TIME(MIN.) = 1.02 Tc(MIN.) = 18.63
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.) = 18.63
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.521
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 1.90 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 0.40 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 1.30 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 4.50 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 1.30 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 3.70 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 13.10 SUBAREA RUNOFF(CFS) = 14.40
EFFECTIVE AREA(ACRES) = 51.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 51.3 PEAK FLOW RATE(CFS) = 56.38
```

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 30.0 INCH PIPE IS 20.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.84
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 56.38
```

PIPE TRAVEL TIME(MIN.) = 6.52 Tc(MIN.) = 25.15
 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	56.38	25.15	1.285	0.30(0.30)	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	588.85	14.40	1.758	0.30(0.11)	0.37	392.3	120.00
2	587.83	14.67	1.739	0.30(0.11)	0.37	396.3	110.00
3	516.82	21.96	1.387	0.30(0.11)	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	636.63	14.40	1.758	0.30(0.13)	0.42	421.7	120.00
2	635.90	14.67	1.739	0.30(0.13)	0.42	426.2	110.00
3	571.14	21.96	1.387	0.30(0.12)	0.41	492.4	100.00
4	532.11	25.15	1.285	0.30(0.13)	0.42	498.9	150.00

TOTAL AREA (ACRES) = 498.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 636.63 Tc(MIN.) = 14.400
 EFFECTIVE AREA(ACRES) = 421.71 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 14.40

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.758

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
"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					

A-33

"FALLOW"	B	0.70	0.30	1.000	86
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.80	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.971
 SUBAREA AREA (ACRES) = 8.90 SUBAREA RUNOFF(CFS) = 11.75
 EFFECTIVE AREA(ACRES) = 430.61 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 507.8 PEAK FLOW RATE(CFS) = 636.63
 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.) = 14.40

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.758

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	B	0.10	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.50	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.40	0.30	1.000	65
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.10	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.919
 SUBAREA AREA (ACRES) = 2.40 SUBAREA RUNOFF(CFS) = 3.20
 EFFECTIVE AREA(ACRES) = 433.01 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 510.2 PEAK FLOW RATE(CFS) = 636.63
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 510.2 TC(MIN.) = 14.40
 EFFECTIVE AREA(ACRES) = 433.01 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.432
 PEAK FLOW RATE(CFS) = 636.63

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	636.63	14.40	1.758	0.30(0.13)	0.43	433.0	120.00
2	635.90	14.67	1.739	0.30(0.13)	0.43	437.5	110.00
3	571.14	21.96	1.387	0.30(0.13)	0.43	503.7	100.00
4	532.11	25.15	1.285	0.30(0.13)	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

Analysis prepared by:

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

* RMV PA-3 SUBAREA A ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 25-YR EV AUGUST 2018 CCHIU *

FILE NAME: PA3A25EV.DAT
TIME/DATE OF STUDY: 11:59 08/15/2018

=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

Table with columns: NO., WIDTH (FT), CROWN TO CROSSFALL (FT), STREET IN- / OUT- / SIDE / SIDE / WAY, STREET CROSSFALL: HEIGHT (FT), CURB HEIGHT (FT), GUTTER WIDTH (FT), STREET LIP (FT), STREET GEOMETRIES: HIKE (FT), MANNING FACTOR (n)

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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.825
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
"OPEN BRUSH" B 1.10 0.30 1.000 66 9.41
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 2.50
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 2.50

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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.636

OA-2

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 0.90 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 2.60 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 0.70 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.983
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.93
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.32
AVERAGE FLOW DEPTH(FEET) = 0.66 TRAVEL TIME(MIN.) = 1.21
Tc(MIN.) = 10.62
SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 8.85
EFFECTIVE AREA(ACRES) = 5.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
TOTAL AREA(ACRES) = 5.3 PEAK FLOW RATE(CFS) = 11.16

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.79 FLOW VELOCITY(FEET/SEC.) = 5.98
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) = 13.42
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.34
HALFSTREET FLOOD WIDTH(FEET) = 9.97
AVERAGE FLOW VELOCITY(FEET/SEC.) = 6.20
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.11
STREET FLOW TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 11.33
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.541

A-1

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	1.10	0.30	0.900	56
COMMERCIAL	B	1.00	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.519
SUBAREA AREA(ACRES) = 2.10 SUBAREA RUNOFF(CFS) = 4.51
EFFECTIVE AREA(ACRES) = 7.40 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 7.4 PEAK FLOW RATE(CFS) = 15.21

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 10.59
FLOW VELOCITY(FEET/SEC.) = 6.37 DEPTH*VELOCITY(FT*FT/SEC.) = 2.24
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) = 25.29
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44

HALFSTREET FLOOD WIDTH(FEET) = 15.35
AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.50
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.40
STREET FLOW TRAVEL TIME(MIN.) = 1.50 Tc(MIN.) = 12.83
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.366

A-2

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	B	6.60	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.80	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.271
SUBAREA AREA(ACRES) = 9.80 SUBAREA RUNOFF(CFS) = 20.15
EFFECTIVE AREA(ACRES) = 17.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 34.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 17.38
FLOW VELOCITY(FEET/SEC.) = 5.91 DEPTH*VELOCITY(FT*FT/SEC.) = 2.80
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 24.0 INCH PIPE IS 18.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.47
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.20
PIPE TRAVEL TIME(MIN.) = 1.80 Tc(MIN.) = 14.63
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.) = 14.63
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.195

A-3

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	B	3.90	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.90	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.255

SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 10.67
EFFECTIVE AREA (ACRES) = 22.80 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 22.8 PEAK FLOW RATE (CFS) = 42.22

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

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

MAINLINE Tc (MIN.) = 14.63
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.195 **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 B 5.00 0.30 0.100 56
PUBLIC PARK B 2.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA (ACRES) = 9.20 SUBAREA RUNOFF (CFS) = 17.18
EFFECTIVE AREA (ACRES) = 32.00 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
TOTAL AREA (ACRES) = 32.0 PEAK FLOW RATE (CFS) = 59.40

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

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

MAINLINE Tc (MIN.) = 14.63
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.195 **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 1.80 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 3.51
EFFECTIVE AREA (ACRES) = 33.80 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
TOTAL AREA (ACRES) = 33.8 PEAK FLOW RATE (CFS) = 62.91

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 33.0 INCH PIPE IS 23.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 13.82

ESTIMATED PIPE DIAMETER (INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 62.91
PIPE TRAVEL TIME (MIN.) = 0.97 Tc (MIN.) = 15.60
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.) = 15.60
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.115 **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 B 7.60 0.30 0.100 56
PUBLIC PARK B 0.40 0.30 0.850 56
COMMERCIAL B 10.50 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.125
SUBAREA AREA (ACRES) = 21.60 SUBAREA RUNOFF (CFS) = 40.39
EFFECTIVE AREA (ACRES) = 55.40 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
TOTAL AREA (ACRES) = 55.4 PEAK FLOW RATE (CFS) = 100.89

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

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

MAINLINE Tc (MIN.) = 15.60
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.115 **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 B 12.10 0.30 0.100 56
PUBLIC PARK B 1.00 0.30 0.850 56
COMMERCIAL B 4.50 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.131
SUBAREA AREA (ACRES) = 24.40 SUBAREA RUNOFF (CFS) = 45.59
EFFECTIVE AREA (ACRES) = 79.80 AREA-AVERAGED Fm (INCH/HR) = 0.08
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.25
TOTAL AREA (ACRES) = 79.8 PEAK FLOW RATE (CFS) = 146.48

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 45.0 INCH PIPE IS 32.0 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 17.42
ESTIMATED PIPE DIAMETER (INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 146.48
PIPE TRAVEL TIME (MIN.) = 0.77 Tc (MIN.) = 16.37
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.) = 16.37 **A-8**
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.057
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 B 6.70 0.30 0.100 56
PUBLIC PARK B 0.10 0.30 0.850 56
COMMERCIAL B 2.50 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.106
SUBAREA AREA (ACRES) = 12.70 SUBAREA RUNOFF (CFS) = 23.15
EFFECTIVE AREA (ACRES) = 92.50 AREA-AVERAGED Fm (INCH/HR) = 0.07
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.23
TOTAL AREA (ACRES) = 92.5 PEAK FLOW RATE (CFS) = 165.48

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

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

MAINLINE Tc (MIN.) = 16.37 **A-7**
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.057
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 B 7.60 0.30 0.100 56
PUBLIC PARK B 0.30 0.30 0.850 56
COMMERCIAL B 4.70 0.30 0.100 56
PUBLIC PARK B 0.40 0.30 0.850 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.150
SUBAREA AREA (ACRES) = 20.90 SUBAREA RUNOFF (CFS) = 37.85
EFFECTIVE AREA (ACRES) = 113.40 AREA-AVERAGED Fm (INCH/HR) = 0.07
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
TOTAL AREA (ACRES) = 113.4 PEAK FLOW RATE (CFS) = 203.33

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 63.0 INCH PIPE IS 50.9 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 10.85
ESTIMATED PIPE DIAMETER (INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 203.33
PIPE TRAVEL TIME (MIN.) = 1.43 Tc (MIN.) = 17.80
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.) = 17.80 **A-18**
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.961
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 B 2.80 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56
COMMERCIAL B 0.60 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.235
SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 14.12
EFFECTIVE AREA (ACRES) = 121.70 AREA-AVERAGED Fm (INCH/HR) = 0.07
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
TOTAL AREA (ACRES) = 121.7 PEAK FLOW RATE (CFS) = 207.59

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

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

MAINLINE Tc (MIN.) = 17.80 **A-9**
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.961
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 B 5.50 0.30 0.200 56
APARTMENTS B 3.20 0.30 0.200 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 15.57
EFFECTIVE AREA (ACRES) = 130.80 AREA-AVERAGED Fm (INCH/HR) = 0.07
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
TOTAL AREA (ACRES) = 130.8 PEAK FLOW RATE (CFS) = 223.16

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.) = 17.80
 RAINFALL INTENSITY(INCH/HR) = 1.96
 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.22
 EFFECTIVE STREAM AREA(ACRES) = 130.80
 TOTAL STREAM AREA(ACRES) = 130.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 223.16

 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

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.417
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.877

A-10

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	0.40	0.30	0.900	56	8.68
COMMERCIAL	B	0.30	0.30	0.100	56	5.42
PUBLIC PARK	B	1.30	0.30	0.850	56	8.61
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	1.00	0.30	0.900	56	8.68

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.798
 SUBAREA RUNOFF(CFS) = 9.82
 TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 9.82

 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) = 15.62
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.37
 HALFSTREET FLOOD WIDTH(FEET) = 11.52

AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.66
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.09
 STREET FLOW TRAVEL TIME(MIN.) = 1.52 Tc(MIN.) = 6.94
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.364

A-11

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.30	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
COMMERCIAL	B	1.00	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.223
 SUBAREA AREA(ACRES) = 3.90 SUBAREA RUNOFF(CFS) = 11.57
 EFFECTIVE AREA(ACRES) = 6.90 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 20.01

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 12.85
 FLOW VELOCITY(FEET/SEC.) = 6.00 DEPTH*VELOCITY(FT*FT/SEC.) = 2.35
 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) = 31.27

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.49
 HALFSTREET FLOOD WIDTH(FEET) = 18.40
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.86
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.39
 STREET FLOW TRAVEL TIME(MIN.) = 1.33 Tc(MIN.) = 8.27

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.042
 SUBAREA LOSS RATE DATA(AMC II):

A-12

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	5.00	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.20	0.30	0.900	56

COMMERCIAL B 1.00 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335
 SUBAREA AREA (ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 22.50
 EFFECTIVE AREA(ACRES) = 15.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
 TOTAL AREA(ACRES) = 15.4 PEAK FLOW RATE(CFS) = 40.51

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.43
 FLOW VELOCITY(FEET/SEC.) = 5.17 DEPTH*VELOCITY(FT*FT/SEC.) = 2.72
 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 18.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.91
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 40.51
 PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 9.11
 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.) = 9.11
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.878
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.60	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455
 SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 7.15
 EFFECTIVE AREA(ACRES) = 18.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 18.3 PEAK FLOW RATE(CFS) = 45.39

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.) = 9.11
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.878

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	9.00	0.30	0.100	56
PUBLIC PARK	B	1.90	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	2.70	0.30	0.900	56
COMMERCIAL	B	4.10	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313
 SUBAREA AREA(ACRES) = 18.00 SUBAREA RUNOFF(CFS) = 45.10
 EFFECTIVE AREA(ACRES) = 36.30 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
 TOTAL AREA(ACRES) = 36.3 PEAK FLOW RATE(CFS) = 90.49

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.) = 9.11
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.878
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	4.50	0.30	0.100	56
PUBLIC PARK	B	1.20	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	3.80	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.515
 SUBAREA AREA(ACRES) = 9.50 SUBAREA RUNOFF(CFS) = 23.29
 EFFECTIVE AREA(ACRES) = 45.80 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 45.8 PEAK FLOW RATE(CFS) = 113.78

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.) = 9.11
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.878
 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	5.30	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND, GRASS"	B	0.30	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 12.99
 EFFECTIVE AREA(ACRES) = 51.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 51.4 PEAK FLOW RATE(CFS) = 126.77

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 39.0 INCH PIPE IS 30.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.44
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 126.77
PIPE TRAVEL TIME(MIN.) = 0.92 Tc(MIN.) = 10.03
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.) = 10.03
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.724
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          B       11.00   0.30  0.100  56
PUBLIC PARK         B        1.80   0.30  0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B        1.50   0.30  0.900  56
COMMERCIAL          B        3.20   0.30  0.100  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.222
SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 49.98
EFFECTIVE AREA(ACRES) = 72.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 72.3 PEAK FLOW RATE(CFS) = 169.62

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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 39.0 INCH PIPE IS 31.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.95
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 169.62
PIPE TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 10.81
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.) = 10.81
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.610
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          B        5.10   0.30  0.100  56
PUBLIC PARK         B        1.90   0.30  0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B        3.60   0.30  0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.485
SUBAREA AREA(ACRES) = 16.20 SUBAREA RUNOFF(CFS) = 35.94
EFFECTIVE AREA(ACRES) = 88.50 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 88.5 PEAK FLOW RATE(CFS) = 198.18

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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.) = 10.81
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.610
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B        2.70   0.30  0.100  56
PUBLIC PARK         B        0.10   0.30  0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B        0.50   0.30  0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 7.54
EFFECTIVE AREA(ACRES) = 91.80 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 91.8 PEAK FLOW RATE(CFS) = 205.72

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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.) = 10.81
RAINFALL INTENSITY(INCH/HR) = 2.61
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.40
EFFECTIVE STREAM AREA(ACRES) = 91.80
TOTAL STREAM AREA(ACRES) = 91.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 205.72

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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	223.16	17.80	1.961	0.30 (0.07)	0.22	130.8	100.00
2	205.72	10.81	2.610	0.30 (0.12)	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	387.57	10.81	2.610	0.30 (0.09)	0.32	171.2	110.00
2	375.22	17.80	1.961	0.30 (0.09)	0.29	222.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 387.57 Tc (MIN.) = 10.81
EFFECTIVE AREA (ACRES) = 171.19 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30 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 75.0 INCH PIPE IS 60.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 14.68
ESTIMATED PIPE DIAMETER (INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 387.57
PIPE TRAVEL TIME (MIN.) = 1.02 Tc (MIN.) = 11.83
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.) = 11.83
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.479

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	B	3.60	0.30	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 10.36
EFFECTIVE AREA (ACRES) = 175.89 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
TOTAL AREA (ACRES) = 227.3 PEAK FLOW RATE (CFS) = 387.57
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.) = 11.83
RAINFALL INTENSITY (INCH/HR) = 2.48
AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA (ACRES) = 175.89
TOTAL STREAM AREA (ACRES) = 227.30
PEAK FLOW RATE (CFS) AT CONFLUENCE = 387.57

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
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 3.381
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	B	0.50	0.30	0.100	56	6.88
PUBLIC PARK	B	0.20	0.30	0.850	56	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	B	2.70	0.30	0.200	56	7.33
RESIDENTIAL						
".4 DWELLING/ACRE"	B	1.40	0.30	0.900	56	11.02
PUBLIC PARK	B	0.10	0.30	0.850	56	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	B	1.30	0.30	0.200	56	7.33

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.381
SUBAREA RUNOFF (CFS) = 18.23
TOTAL AREA (ACRES) = 6.20 PEAK FLOW RATE (CFS) = 18.23

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
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 3.381

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"	B	0.20	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.900$
 SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF (CFS) = 0.56
 EFFECTIVE AREA (ACRES) = 6.40 AREA-AVERAGED F_m (INCH/HR) = 0.12
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.40$
 TOTAL AREA (ACRES) = 6.4 PEAK FLOW RATE (CFS) = 18.79

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 21.0 INCH PIPE IS 15.7 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 9.72
 ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 18.79
 PIPE TRAVEL TIME (MIN.) = 0.73 T_c (MIN.) = 7.61
 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 T_c (MIN.) = 7.61
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 3.192

A-21

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.40	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.40	0.30	0.900	56
COMMERCIAL	B	0.70	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.60	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.423$
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 25.10
 EFFECTIVE AREA (ACRES) = 15.50 AREA-AVERAGED F_m (INCH/HR) = 0.12
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.41$
 TOTAL AREA (ACRES) = 15.5 PEAK FLOW RATE (CFS) = 42.80

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 20.1 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 12.24
 ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 42.80
 PIPE TRAVEL TIME (MIN.) = 1.40 T_c (MIN.) = 9.01

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 T_c (MIN.) = 9.01
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.897

A-22

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
APARTMENTS	B	7.60	0.30	0.200	56
COMMERCIAL	B	1.40	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.30	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	6.50	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	8.40	0.30	0.600	56
APARTMENTS	B	0.50	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.491$
 SUBAREA AREA (ACRES) = 26.70 SUBAREA RUNOFF (CFS) = 66.07
 EFFECTIVE AREA (ACRES) = 42.20 AREA-AVERAGED F_m (INCH/HR) = 0.14
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.46$
 TOTAL AREA (ACRES) = 42.2 PEAK FLOW RATE (CFS) = 104.75

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

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

MAINLINE T_c (MIN.) = 9.01
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.897

A-22

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
COMMERCIAL	B	0.30	0.30	0.100	56
PUBLIC PARK	B	1.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.00	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	3.80	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.80	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.642$
 SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF (CFS) = 26.77
 EFFECTIVE AREA (ACRES) = 53.20 AREA-AVERAGED F_m (INCH/HR) = 0.15
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.50$
 TOTAL AREA (ACRES) = 53.2 PEAK FLOW RATE (CFS) = 131.52

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 51.0 INCH PIPE IS 36.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.06
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 131.52
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 9.32
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.) = 9.32
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.842
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 1.60 0.30 0.100 56
PUBLIC PARK B 0.20 0.30 0.850 56
APARTMENTS B 0.30 0.30 0.200 56
COMMERCIAL B 2.10 0.30 0.100 56
PUBLIC PARK B 0.60 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.231
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 12.23
EFFECTIVE AREA(ACRES) = 58.10 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 58.1 PEAK FLOW RATE(CFS) = 141.11

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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.) = 9.32
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.842
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 0.20 0.30 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.50
EFFECTIVE AREA(ACRES) = 58.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 58.3 PEAK FLOW RATE(CFS) = 141.61

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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 39.0 INCH PIPE IS 27.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.63
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 141.61
PIPE TRAVEL TIME(MIN.) = 0.94 Tc(MIN.) = 10.25
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.) = 10.25
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.690
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 0.50 0.30 0.200 56
COMMERCIAL B 1.20 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.20 0.30 0.900 56
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 1.60 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.00 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.550
SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 17.27
EFFECTIVE AREA(ACRES) = 65.90 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 65.9 PEAK FLOW RATE(CFS) = 150.92

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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.) = 10.25
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.690
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 1.90 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.60 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.30 0.30 0.600 56
APARTMENTS B 5.00 0.30 0.200 56
PUBLIC PARK B 2.30 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.50 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 30.98
EFFECTIVE AREA(ACRES) = 79.50 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49

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A-25.1

TOTAL AREA (ACRES) = 79.5 PEAK FLOW RATE (CFS) = 181.90

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

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

MAINLINE Tc (MIN.) = 10.25

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.690

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"	B	10.20	0.30	0.600	56

RESIDENTIAL

"3-4 DWELLINGS/ACRE" B 10.20 0.30 0.600 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600

SUBAREA AREA (ACRES) = 10.20 SUBAREA RUNOFF (CFS) = 23.04

EFFECTIVE AREA (ACRES) = 89.70 AREA-AVERAGED Fm (INCH/HR) = 0.15

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50

TOTAL AREA (ACRES) = 89.7 PEAK FLOW RATE (CFS) = 204.95

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 45.0 INCH PIPE IS 34.1 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 22.79

ESTIMATED PIPE DIAMETER (INCH) = 45.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 204.95

PIPE TRAVEL TIME (MIN.) = 0.41 Tc (MIN.) = 10.66

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.) = 10.66

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.630

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	B	5.90	0.30	0.200	56
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
APARTMENTS	B	6.00	0.30	0.200	56
COMMERCIAL	B	1.10	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	4.70	0.30	0.900	56

RESIDENTIAL

"4 DWELLING/ACRE" B 0.60 0.30 0.900 56

APARTMENTS B 6.00 0.30 0.200 56

COMMERCIAL B 1.10 0.30 0.100 56

RESIDENTIAL

"4 DWELLING/ACRE" B 4.70 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.395

SUBAREA AREA (ACRES) = 18.40 SUBAREA RUNOFF (CFS) = 41.59

EFFECTIVE AREA (ACRES) = 108.10 AREA-AVERAGED Fm (INCH/HR) = 0.15

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49

TOTAL AREA (ACRES) = 108.1 PEAK FLOW RATE (CFS) = 241.70

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 54.0 INCH PIPE IS 42.5 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 17.98

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

PIPE-FLOW (CFS) = 241.70

PIPE TRAVEL TIME (MIN.) = 0.56 Tc (MIN.) = 11.23

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.) = 11.23

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.554

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	B	1.10	0.30	0.200	56
COMMERCIAL	B	12.70	0.30	0.100	56
PUBLIC PARK	B	0.80	0.30	0.850	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	4.10	0.30	0.900	56

COMMERCIAL

PUBLIC PARK B 0.20 0.30 0.850 56

APARTMENTS B 1.10 0.30 0.200 56

COMMERCIAL B 12.70 0.30 0.100 56

PUBLIC PARK B 0.80 0.30 0.850 56

RESIDENTIAL

"4 DWELLING/ACRE" B 4.10 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303

SUBAREA AREA (ACRES) = 20.40 SUBAREA RUNOFF (CFS) = 45.22

EFFECTIVE AREA (ACRES) = 128.50 AREA-AVERAGED Fm (INCH/HR) = 0.14

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46

TOTAL AREA (ACRES) = 128.5 PEAK FLOW RATE (CFS) = 279.49

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

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

MAINLINE Tc (MIN.) = 11.23

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.554

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	1.20	0.30	0.100	56
PUBLIC PARK	B	1.50	0.30	0.850	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

RESIDENTIAL

"4 DWELLING/ACRE" B 0.10 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530

SUBAREA AREA (ACRES) = 2.80 SUBAREA RUNOFF (CFS) = 6.03
 EFFECTIVE AREA (ACRES) = 131.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 131.3 PEAK FLOW RATE (CFS) = 285.53

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

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

MAINLINE Tc (MIN.) = 11.23
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.554
 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 B 1.30 0.30 0.100 56
 COMMERCIAL B 12.60 0.30 0.100 56
 PUBLIC PARK B 1.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.10 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.238
 SUBAREA AREA (ACRES) = 18.20 SUBAREA RUNOFF (CFS) = 40.66
 EFFECTIVE AREA (ACRES) = 149.50 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 149.5 PEAK FLOW RATE (CFS) = 326.19

A-28

 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 51.0 INCH PIPE IS 36.6 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 29.90
 ESTIMATED PIPE DIAMETER (INCH) = 51.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 326.19
 PIPE TRAVEL TIME (MIN.) = 0.41 Tc (MIN.) = 11.64
 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.) = 11.64
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.501
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 2.20 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.40 0.30 0.900 56

A-29

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.223
 SUBAREA AREA (ACRES) = 2.60 SUBAREA RUNOFF (CFS) = 5.70
 EFFECTIVE AREA (ACRES) = 152.10 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 152.1 PEAK FLOW RATE (CFS) = 326.19
 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.) = 11.64
 RAINFALL INTENSITY (INCH/HR) = 2.50
 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.43
 EFFECTIVE STREAM AREA (ACRES) = 152.10
 TOTAL STREAM AREA (ACRES) = 152.10
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 326.19

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	387.57	11.83	2.479	0.30 (0.09)	0.31	175.9	110.00
1	375.22	18.83	1.899	0.30 (0.09)	0.29	227.3	100.00
2	326.19	11.64	2.501	0.30 (0.13)	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	711.27	11.64	2.501	0.30 (0.11)	0.37	325.2	120.00
2	710.63	11.83	2.479	0.30 (0.11)	0.36	328.0	110.00
3	618.61	18.83	1.899	0.30 (0.10)	0.34	379.4	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE (CFS) = 711.27 Tc (MIN.) = 11.64
 EFFECTIVE AREA (ACRES) = 325.21 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 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 87.0 INCH PIPE IS 69.3 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 20.16
 ESTIMATED PIPE DIAMETER (INCH) = 87.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 711.27
 PIPE TRAVEL TIME (MIN.) = 1.23 Tc (MIN.) = 12.88
 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.) = 12.88
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.361 **A-30**
 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
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.60 0.30 0.900 56
 COMMERCIAL B 1.80 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.40 0.30 0.900 56
 COMMERCIAL B 0.80 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.60 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.524
 SUBAREA AREA (ACRES) = 6.80 SUBAREA RUNOFF (CFS) = 13.49
 EFFECTIVE AREA (ACRES) = 332.01 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA (ACRES) = 386.2 PEAK FLOW RATE (CFS) = 711.27
 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.) = 12.88
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.361 **A-31**
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 2.50 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) = 9.55
 EFFECTIVE AREA (ACRES) = 336.71 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37

TOTAL AREA (ACRES) = 390.9 PEAK FLOW RATE (CFS) = 711.27
 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.) = 12.88
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.361 **A-31**
 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 2.90 0.30 0.400 56
 COMMERCIAL B 4.70 0.30 0.100 56
 PUBLIC PARK B 1.30 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.90 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 3.80 0.30 0.600 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.386
 SUBAREA AREA (ACRES) = 13.70 SUBAREA RUNOFF (CFS) = 27.68
 EFFECTIVE AREA (ACRES) = 350.41 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA (ACRES) = 404.6 PEAK FLOW RATE (CFS) = 711.27
 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.) = 12.88
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.361 **A-31**
 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" B 4.40 0.30 0.500 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.70 0.30 0.400 56
 COMMERCIAL B 5.00 0.30 0.100 56
 PUBLIC PARK B 0.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 10.30 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.253
 SUBAREA AREA (ACRES) = 20.60 SUBAREA RUNOFF (CFS) = 42.36
 EFFECTIVE AREA (ACRES) = 371.01 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
 TOTAL AREA (ACRES) = 425.2 PEAK FLOW RATE (CFS) = 752.04

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

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

MAINLINE Tc(MIN.) = 12.88
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.361

A-31

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" B 1.30 0.30 0.600 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 3.90 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 2.30 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.487
SUBAREA AREA(ACRES) = 7.50 SUBAREA RUNOFF(CFS) = 14.95
EFFECTIVE AREA(ACRES) = 378.51 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 432.7 PEAK FLOW RATE(CFS) = 766.99

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 78.0 INCH PIPE IS 62.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.11
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 766.99
PIPE TRAVEL TIME(MIN.) = 1.10 Tc(MIN.) = 13.97
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.) = 13.97
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.253

A-32

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.30 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 B 1.30 0.30 0.100 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.00 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.598
SUBAREA AREA(ACRES) = 7.00 SUBAREA RUNOFF(CFS) = 13.06
EFFECTIVE AREA(ACRES) = 385.51 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 439.7 PEAK FLOW RATE(CFS) = 766.99
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.) = 13.97
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.253

A-32

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" B 2.50 0.30 0.600 56
COMMERCIAL B 0.80 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.30 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.30 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.599
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 14.74
EFFECTIVE AREA(ACRES) = 393.41 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 447.6 PEAK FLOW RATE(CFS) = 766.99
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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.843
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
"OPEN BRUSH" B 1.50 0.30 1.000 66 9.31
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.40 0.30 1.000 65 9.31
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

OA-4

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 4.35
TOTAL AREA (ACRES) = 1.90 PEAK FLOW RATE (CFS) = 4.35

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

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.659

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"	B	4.90	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND,GRASS"	B	2.40	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.10
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.10
AVERAGE FLOW DEPTH(FEET) = 0.81 TRAVEL TIME(MIN.) = 1.15
Tc(MIN.) = 10.46
SUBAREA AREA(ACRES) = 7.30 SUBAREA RUNOFF(CFS) = 15.50
EFFECTIVE AREA(ACRES) = 9.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 9.2 PEAK FLOW RATE(CFS) = 19.53

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.97 FLOW VELOCITY(FEET/SEC.) = 6.87
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	17.3 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	7.23		
ESTIMATED PIPE DIAMETER(INCH) =	27.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	19.53		
PIPE TRAVEL TIME(MIN.) =	1.15	Tc(MIN.) =	11.62

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.) = 11.62

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.504

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"	B	5.10	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND,GRASS"	B	4.00	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 18.05
EFFECTIVE AREA(ACRES) = 18.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 18.3 PEAK FLOW RATE(CFS) = 36.30

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	45.0 INCH PIPE IS	31.7 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	4.37		
ESTIMATED PIPE DIAMETER(INCH) =	45.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	36.30		
PIPE TRAVEL TIME(MIN.) =	2.71	Tc(MIN.) =	14.33

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.) = 14.33

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* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.220

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	0.30	0.30	1.000	63
NATURAL FAIR COVER "CHAPARRAL,NARROWLEAF"	B	5.70	0.30	1.000	72
NATURAL FAIR COVER "OPEN BRUSH"	B	3.40	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND,GRASS"	B	0.10	0.30	1.000	65
NATURAL FAIR COVER "CHAPARRAL,NARROWLEAF"	B	2.10	0.30	1.000	72
NATURAL FAIR COVER "OPEN BRUSH"	B	1.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 13.20 SUBAREA RUNOFF(CFS) = 22.81
EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 54.44

```
*****
FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.33
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.220
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" B 0.20 0.30 1.000 65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.35
EFFECTIVE AREA(ACRES) = 31.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.7 PEAK FLOW RATE(CFS) = 54.79
```

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 48.0 INCH PIPE IS 34.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.71
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 54.79
PIPE TRAVEL TIME(MIN.) = 2.65 Tc(MIN.) = 16.99
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 155.00 = 2873.00 FEET.
```

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

```
MAINLINE Tc(MIN.) = 16.99
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.014
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 1.60 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 1.60 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 1.80 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 1.50 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 6.50 SUBAREA RUNOFF(CFS) = 10.03
EFFECTIVE AREA(ACRES) = 38.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
```

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TOTAL AREA(ACRES) = 38.2 PEAK FLOW RATE(CFS) = 58.94

```
*****
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 30.0 INCH PIPE IS 24.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.96
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 58.94
PIPE TRAVEL TIME(MIN.) = 0.95 Tc(MIN.) = 17.94
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.) = 17.94
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.953
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 1.90 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 0.40 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 1.30 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 4.50 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 1.30 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 3.70 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 13.10 SUBAREA RUNOFF(CFS) = 19.48
EFFECTIVE AREA(ACRES) = 51.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 51.3 PEAK FLOW RATE(CFS) = 76.30
```

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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 33.0 INCH PIPE IS 23.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.02
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 76.30
```

PIPE TRAVEL TIME(MIN.) = 6.07 Tc(MIN.) = 24.00
 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	76.30	24.00	1.652	0.30(0.30)	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	766.99	13.97	2.253	0.30(0.11)	0.37	393.4	120.00
2	766.00	14.16	2.236	0.30(0.11)	0.37	396.2	110.00
3	671.89	21.22	1.773	0.30(0.11)	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	831.13	13.97	2.253	0.30(0.13)	0.42	423.3	120.00
2	830.43	14.16	2.236	0.30(0.13)	0.42	426.5	110.00
3	745.38	21.22	1.773	0.30(0.12)	0.41	493.0	100.00
4	699.51	24.00	1.652	0.30(0.13)	0.42	498.9	150.00

TOTAL AREA (ACRES) = 498.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 831.13 Tc(MIN.) = 13.973
 EFFECTIVE AREA(ACRES) = 423.27 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 13.97

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.253

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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
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"	B	0.70	0.30	1.000	86
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.80	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.971
 SUBAREA AREA (ACRES) = 8.90 SUBAREA RUNOFF(CFS) = 15.71
 EFFECTIVE AREA(ACRES) = 432.17 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 507.8 PEAK FLOW RATE(CFS) = 831.13
 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.) = 13.97

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.253

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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
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.50	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.40	0.30	1.000	65
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.10	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.919
 SUBAREA AREA (ACRES) = 2.40 SUBAREA RUNOFF(CFS) = 4.27
 EFFECTIVE AREA(ACRES) = 434.57 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 510.2 PEAK FLOW RATE(CFS) = 831.13
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 510.2 TC(MIN.) = 13.97
 EFFECTIVE AREA(ACRES) = 434.57 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.432
 PEAK FLOW RATE(CFS) = 831.13

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	831.13	13.97	2.253	0.30(0.13)	0.43	434.6	120.00
2	830.43	14.16	2.236	0.30(0.13)	0.43	437.8	110.00
3	746.53	21.22	1.773	0.30(0.13)	0.43	504.3	100.00
4	699.51	24.00	1.652	0.30(0.13)	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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Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA A ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 50-YR EV AUGUST 2018 CCHIU *

FILE NAME: PA3A50EV.DAT
TIME/DATE OF STUDY: 11:59 08/15/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 15.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 4.440
- 2) 10.00; 3.010
- 3) 15.00; 2.390
- 4) 20.00; 2.030
- 5) 25.00; 1.790
- 6) 30.00; 1.600
- 7) 40.00; 1.370
- 8) 50.00; 1.200
- 9) 60.00; 1.060
- 10) 90.00; 0.860
- 11) 120.00; 0.730
- 12) 180.00; 0.590
- 13) 360.00; 0.410
- 14) 1200.00; 0.170

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 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	0.020/0.020/ ---	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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.178
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"	B	1.10	0.30	1.000	66	9.41

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 2.85
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 2.85

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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.937

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	0.90	0.30	1.000	63
NATURAL FAIR COVER "OPEN BRUSH"	B	2.60	0.30	1.000	66
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.983
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.85
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.47
AVERAGE FLOW DEPTH(FEET) = 0.69 TRAVEL TIME(MIN.) = 1.17
Tc(MIN.) = 10.59
SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 9.99
EFFECTIVE AREA(ACRES) = 5.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99

OA-2

TOTAL AREA (ACRES) = 5.3 PEAK FLOW RATE (CFS) = 12.60

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 0.83 FLOW VELOCITY (FEET/SEC.) = 6.14
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 (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 15.15

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.35
HALFSTREET FLOOD WIDTH (FEET) = 10.59
AVERAGE FLOW VELOCITY (FEET/SEC.) = 6.34
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 2.23

STREET FLOW TRAVEL TIME (MIN.) = 0.69 Tc (MIN.) = 11.28

* 15 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
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.10	0.30	0.900	56
COMMERCIAL	B	1.00	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.519
SUBAREA AREA (ACRES) = 2.10 SUBAREA RUNOFF (CFS) = 5.09
EFFECTIVE AREA (ACRES) = 7.40 AREA-AVERAGED Fm (INCH/HR) = 0.26
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.85
TOTAL AREA (ACRES) = 7.4 PEAK FLOW RATE (CFS) = 17.28

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.36 HALFSTREET FLOOD WIDTH (FEET) = 11.21
FLOW VELOCITY (FEET/SEC.) = 6.57 DEPTH*VELOCITY (FT*FT/SEC.) = 2.38
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 (curb-to-curb) = 0.0150

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 28.70

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.45
HALFSTREET FLOOD WIDTH (FEET) = 16.21
AVERAGE FLOW VELOCITY (FEET/SEC.) = 5.65
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 2.55

STREET FLOW TRAVEL TIME (MIN.) = 1.46 Tc (MIN.) = 12.74

* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.671

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	B	6.60	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.80	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.271

SUBAREA AREA (ACRES) = 9.80 SUBAREA RUNOFF (CFS) = 22.84

EFFECTIVE AREA (ACRES) = 17.20 AREA-AVERAGED Fm (INCH/HR) = 0.16

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52

TOTAL AREA (ACRES) = 17.2 PEAK FLOW RATE (CFS) = 38.92

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.49 HALFSTREET FLOOD WIDTH (FEET) = 18.32
FLOW VELOCITY (FEET/SEC.) = 6.10 DEPTH*VELOCITY (FT*FT/SEC.) = 2.99
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 17.6 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 14.14

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

PIPE-FLOW (CFS) = 38.92

PIPE TRAVEL TIME (MIN.) = 1.72 Tc (MIN.) = 14.45

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

A-2

A-1

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

MAINLINE Tc(MIN.) = 14.45
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.458 **A-3**
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
COMMERCIAL B 3.90 0.30 0.100 56
PUBLIC PARK B 0.20 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.90 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.255
SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 12.00
EFFECTIVE AREA(ACRES) = 22.80 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 22.8 PEAK FLOW RATE(CFS) = 47.62

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

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

MAINLINE Tc(MIN.) = 14.45
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.458 **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 B 5.00 0.30 0.100 56
PUBLIC PARK B 2.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 9.20 SUBAREA RUNOFF(CFS) = 19.36
EFFECTIVE AREA(ACRES) = 32.00 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 32.0 PEAK FLOW RATE(CFS) = 66.98

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

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

MAINLINE Tc(MIN.) = 14.45
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.458 **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 1.80 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA AREA(ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 3.93
EFFECTIVE AREA(ACRES) = 33.80 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 33.8 PEAK FLOW RATE(CFS) = 70.92

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 33.0 INCH PIPE IS 26.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.00
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 70.92
PIPE TRAVEL TIME(MIN.) = 0.96 Tc(MIN.) = 15.41
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.) = 15.41
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.360 **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 B 7.60 0.30 0.100 56
PUBLIC PARK B 0.40 0.30 0.850 56
COMMERCIAL B 10.50 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.125
SUBAREA AREA(ACRES) = 21.60 SUBAREA RUNOFF(CFS) = 45.16
EFFECTIVE AREA(ACRES) = 55.40 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 55.4 PEAK FLOW RATE(CFS) = 113.11

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

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

MAINLINE Tc(MIN.) = 15.41
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.360 **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 B 12.10 0.30 0.100 56
PUBLIC PARK B 1.00 0.30 0.850 56
COMMERCIAL B 4.50 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.131
 SUBAREA AREA(ACRES) = 24.40 SUBAREA RUNOFF(CFS) = 50.97
 EFFECTIVE AREA(ACRES) = 79.80 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.25
 TOTAL AREA(ACRES) = 79.8 PEAK FLOW RATE(CFS) = 164.09

 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 45.0 INCH PIPE IS 35.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.65
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 164.09
 PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 16.17
 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.) = 16.17 **A-8**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.306
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.40	0.30	0.100	56
COMMERCIAL	B	6.70	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
COMMERCIAL	B	2.50	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.106
 SUBAREA AREA(ACRES) = 12.70 SUBAREA RUNOFF(CFS) = 25.99
 EFFECTIVE AREA(ACRES) = 92.50 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.23
 TOTAL AREA(ACRES) = 92.5 PEAK FLOW RATE(CFS) = 186.13

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

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

MAINLINE Tc(MIN.) = 16.17 **A-7**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.306
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	7.20	0.30	0.100	56
PUBLIC PARK	B	0.70	0.30	0.850	56
COMMERCIAL	B	7.60	0.30	0.100	56
PUBLIC PARK	B	0.30	0.30	0.850	56
COMMERCIAL	B	4.70	0.30	0.100	56
PUBLIC PARK	B	0.40	0.30	0.850	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.150
 SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 42.52
 EFFECTIVE AREA(ACRES) = 113.40 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
 TOTAL AREA(ACRES) = 113.4 PEAK FLOW RATE(CFS) = 228.65

 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 66.0 INCH PIPE IS 53.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.19
 ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 228.65
 PIPE TRAVEL TIME(MIN.) = 1.39 Tc(MIN.) = 17.56
 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.) = 17.56 **A-18**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.205
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.50	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
COMMERCIAL	B	2.80	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.80	0.30	0.900	56
COMMERCIAL	B	0.60	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.235
 SUBAREA AREA(ACRES) = 8.30 SUBAREA RUNOFF(CFS) = 15.95
 EFFECTIVE AREA(ACRES) = 121.70 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
 TOTAL AREA(ACRES) = 121.7 PEAK FLOW RATE(CFS) = 234.39

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

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

MAINLINE Tc(MIN.) = 17.56 **A-9**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.205
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	0.40	0.30	0.200	56
APARTMENTS	B	5.50	0.30	0.200	56

APARTMENTS B 3.20 0.30 0.200 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 17.57
 EFFECTIVE AREA (ACRES) = 130.80 AREA-AVERAGED Fm (INCH/HR) = 0.07
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
 TOTAL AREA (ACRES) = 130.8 PEAK FLOW RATE (CFS) = 251.96

 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.) = 17.56
 RAINFALL INTENSITY (INCH/HR) = 2.21
 AREA-AVERAGED Fm (INCH/HR) = 0.07
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.22
 EFFECTIVE STREAM AREA (ACRES) = 130.80
 TOTAL STREAM AREA (ACRES) = 130.80
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 251.96

 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
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 4.321

A-10

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"	B	0.40	0.30	0.900	56	8.68
COMMERCIAL	B	0.30	0.30	0.100	56	5.42
PUBLIC PARK	B	1.30	0.30	0.850	56	8.61
RESIDENTIAL						
".4 DWELLING/ACRE"	B	1.00	0.30	0.900	56	8.68

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.798
 SUBAREA RUNOFF (CFS) = 11.02
 TOTAL AREA (ACRES) = 3.00 PEAK FLOW RATE (CFS) = 11.02

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 17.75
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.38
 HALFSTREET FLOOD WIDTH (FEET) = 12.23
 AVERAGE FLOW VELOCITY (FEET/SEC.) = 5.81
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 2.21
 STREET FLOW TRAVEL TIME (MIN.) = 1.48 Tc (MIN.) = 6.90
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 3.896

A-11

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.30	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
COMMERCIAL	B	1.00	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.223
 SUBAREA AREA (ACRES) = 3.90 SUBAREA RUNOFF (CFS) = 13.44
 EFFECTIVE AREA (ACRES) = 6.90 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA (ACRES) = 6.9 PEAK FLOW RATE (CFS) = 23.31

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.41 HALFSTREET FLOOD WIDTH (FEET) = 13.71
 FLOW VELOCITY (FEET/SEC.) = 6.23 DEPTH*VELOCITY (FT*FT/SEC.) = 2.54
 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 (curb-to-curb) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 36.44
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.51
 HALFSTREET FLOOD WIDTH(FEET) = 19.57
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.04
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.58
 STREET FLOW TRAVEL TIME(MIN.) = 1.29 Tc(MIN.) = 8.19
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.528

A-12

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	5.00	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
COMMERCIAL	B	1.00	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.335
 SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 26.22
 EFFECTIVE AREA(ACRES) = 15.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
 TOTAL AREA(ACRES) = 15.4 PEAK FLOW RATE(CFS) = 47.25

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55 HALFSTREET FLOOD WIDTH(FEET) = 21.68
 FLOW VELOCITY(FEET/SEC.) = 5.38 DEPTH*VELOCITY(FT*FT/SEC.) = 2.96
 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 21.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.20
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 47.25
 PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 9.01
 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.) = 9.01
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.293
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.60	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					

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".4 DWELLING/ACRE" B 1.10 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.455
 SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 8.24
 EFFECTIVE AREA(ACRES) = 18.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 18.3 PEAK FLOW RATE(CFS) = 52.22

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

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

MAINLINE Tc(MIN.) = 9.01
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.293
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	9.00	0.30	0.100	56
PUBLIC PARK	B	1.90	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.70	0.30	0.900	56
COMMERCIAL	B	4.10	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.313
 SUBAREA AREA(ACRES) = 18.00 SUBAREA RUNOFF(CFS) = 51.82
 EFFECTIVE AREA(ACRES) = 36.30 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
 TOTAL AREA(ACRES) = 36.3 PEAK FLOW RATE(CFS) = 104.05

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

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

MAINLINE Tc(MIN.) = 9.01
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.293
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	4.50	0.30	0.100	56
PUBLIC PARK	B	1.20	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	3.80	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.515
 SUBAREA AREA(ACRES) = 9.50 SUBAREA RUNOFF(CFS) = 26.83
 EFFECTIVE AREA(ACRES) = 45.80 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 45.8 PEAK FLOW RATE(CFS) = 130.88

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

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

MAINLINE Tc(MIN.) = 9.01
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.293 **OA-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"	B	5.30	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND,GRASS"	B	0.30	0.30	1.000	65

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 15.08
 EFFECTIVE AREA(ACRES) = 51.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 51.4 PEAK FLOW RATE(CFS) = 145.96

 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 30.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.26
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 145.96
 PIPE TRAVEL TIME(MIN.) = 0.88 Tc(MIN.) = 9.89
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 115.00 = 2955.00 FEET.

 FLOW PROCESS FROM NODE 115.00 TO NODE 115.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 9.89 **A-16**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.041
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.40	0.30	0.100	56
COMMERCIAL	B	11.00	0.30	0.100	56
PUBLIC PARK	B	1.80	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.50	0.30	0.900	56
COMMERCIAL	B	3.20	0.30	0.100	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.222
 SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 55.95
 EFFECTIVE AREA(ACRES) = 72.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 72.3 PEAK FLOW RATE(CFS) = 190.26

 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)<<<<<

 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 31.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 24.98
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 190.26
 PIPE TRAVEL TIME(MIN.) = 0.74 Tc(MIN.) = 10.63
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 108.00 = 4065.00 FEET.

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

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

 MAINLINE Tc(MIN.) = 10.63 **A-17**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.932
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS 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	B	5.10	0.30	0.100	56
PUBLIC PARK	B	1.90	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	3.60	0.30	0.900	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.485
 SUBAREA AREA(ACRES) = 16.20 SUBAREA RUNOFF(CFS) = 40.62
 EFFECTIVE AREA(ACRES) = 88.50 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 88.5 PEAK FLOW RATE(CFS) = 223.77

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

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

 MAINLINE Tc(MIN.) = 10.63 **A-17**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.932
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.70	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
 SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 8.49
 EFFECTIVE AREA(ACRES) = 91.80 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
 TOTAL AREA(ACRES) = 91.8 PEAK FLOW RATE(CFS) = 232.26

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

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.63
RAINFALL INTENSITY(INCH/HR) = 2.93
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.40
EFFECTIVE STREAM AREA(ACRES) = 91.80
TOTAL STREAM AREA(ACRES) = 91.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 232.26

** 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) = 436.54 Tc(MIN.) = 10.63
EFFECTIVE AREA(ACRES) = 170.99 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.30 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 78.0 INCH PIPE IS 63.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.07
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 436.54
PIPE TRAVEL TIME(MIN.) = 1.00 Tc(MIN.) = 11.63
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.) = 11.63

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.808

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.10 0.30 0.100 56
COMMERCIAL B 3.60 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 11.75
EFFECTIVE AREA(ACRES) = 175.69 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 227.3 PEAK FLOW RATE(CFS) = 436.54
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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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.) = 11.63
RAINFALL INTENSITY(INCH/HR) = 2.81
AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA(ACRES) = 175.69
TOTAL STREAM AREA(ACRES) = 227.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 436.54

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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.902
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 B 0.50 0.30 0.100 56 6.88
PUBLIC PARK B 0.20 0.30 0.850 56 10.93
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 2.70 0.30 0.200 56 7.33
RESIDENTIAL
".4 DWELLING/ACRE" B 1.40 0.30 0.900 56 11.02
PUBLIC PARK B 0.10 0.30 0.850 56 10.93
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 1.30 0.30 0.200 56 7.33
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.381
SUBAREA RUNOFF(CFS) = 21.14

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TOTAL AREA (ACRES) = 6.20 PEAK FLOW RATE (CFS) = 21.14

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
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.902 **A-20**
 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" B 0.20 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.65
 EFFECTIVE AREA(ACRES) = 6.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
 TOTAL AREA(ACRES) = 6.4 PEAK FLOW RATE(CFS) = 21.79

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 15.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.26
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 21.79
 PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 7.57
 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.) = 7.57
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.705 **A-21**
 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 5.40 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.40 0.30 0.900 56
 COMMERCIAL B 0.70 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.60 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.423
 SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 29.30
 EFFECTIVE AREA(ACRES) = 15.50 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41

TOTAL AREA (ACRES) = 15.5 PEAK FLOW RATE (CFS) = 49.96

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 22.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.53
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 49.96
 PIPE TRAVEL TIME(MIN.) = 1.37 Tc(MIN.) = 8.94
 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.) = 8.94
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.313 **A-22**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 APARTMENTS B 7.60 0.30 0.200 56
 COMMERCIAL B 1.40 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 2.30 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 6.50 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 8.40 0.30 0.600 56
 APARTMENTS B 0.50 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.491
 SUBAREA AREA(ACRES) = 26.70 SUBAREA RUNOFF(CFS) = 76.08
 EFFECTIVE AREA(ACRES) = 42.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 42.2 PEAK FLOW RATE(CFS) = 120.57

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

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

MAINLINE Tc(MIN.) = 8.94
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.313 **A-22**
 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
 PUBLIC PARK B 1.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 2.00 0.30 0.200 56
 RESIDENTIAL

"4 DWELLING/ACRE" B 3.80 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 3.80 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.642
 SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 30.89
 EFFECTIVE AREA (ACRES) = 53.20 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA (ACRES) = 53.2 PEAK FLOW RATE (CFS) = 151.47

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 606.00 DOWNSTREAM(FEET) = 604.00
 FLOW LENGTH(FEET) = 222.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 41.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.22
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 151.47
 PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 9.24
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 124.00 = 2006.00 FEET.

 FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 9.24
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.227
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	0.10	0.30	0.200	56
COMMERCIAL	B	1.60	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
APARTMENTS	B	0.30	0.30	0.200	56
COMMERCIAL	B	2.10	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.231
 SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 13.92
 EFFECTIVE AREA (ACRES) = 58.10 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 58.1 PEAK FLOW RATE (CFS) = 161.24

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 FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 9.24
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.227
 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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A-23

RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.20 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.57
 EFFECTIVE AREA (ACRES) = 58.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 58.3 PEAK FLOW RATE (CFS) = 161.81

 FLOW PROCESS FROM NODE 124.00 TO NODE 125.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 604.00 DOWNSTREAM(FEET) = 546.00
 FLOW LENGTH(FEET) = 1271.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.98
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 161.81
 PIPE TRAVEL TIME(MIN.) = 0.92 Tc(MIN.) = 10.16
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 125.00 = 3277.00 FEET.

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

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

=====

MAINLINE Tc(MIN.) = 10.16
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.990
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	0.50	0.30	0.200	56
COMMERCIAL	B	1.20	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	1.20	0.30	0.900	56
APARTMENTS	B	0.10	0.30	0.200	56
COMMERCIAL	B	1.60	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	3.00	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.550
 SUBAREA AREA (ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 19.32
 EFFECTIVE AREA (ACRES) = 65.90 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 65.9 PEAK FLOW RATE (CFS) = 168.70

A-25

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

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

=====

MAINLINE Tc(MIN.) = 10.16
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.990
 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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A-25.1

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
APARTMENTS	B	1.90	0.30	0.200	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.30	0.30	0.600	56
APARTMENTS	B	5.00	0.30	0.200	56
PUBLIC PARK	B	2.30	0.30	0.850	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	3.50	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
SUBAREA AREA (ACRES) = 13.60 SUBAREA RUNOFF (CFS) = 34.65
EFFECTIVE AREA (ACRES) = 79.50 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
TOTAL AREA (ACRES) = 79.5 PEAK FLOW RATE (CFS) = 203.34

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

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

MAINLINE Tc(MIN.) = 10.16
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.990
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	10.20	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA (ACRES) = 10.20 SUBAREA RUNOFF (CFS) = 25.79
EFFECTIVE AREA (ACRES) = 89.70 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 89.7 PEAK FLOW RATE (CFS) = 229.14

A-25.1

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 34.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 23.61
ESTIMATED PIPE DIAMETER (INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 229.14
PIPE TRAVEL TIME (MIN.) = 0.40 Tc (MIN.) = 10.56
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.) = 10.56
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.940

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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
APARTMENTS	B	5.90	0.30	0.200	56
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
APARTMENTS	B	6.00	0.30	0.200	56
COMMERCIAL	B	1.10	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	4.70	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.395
SUBAREA AREA (ACRES) = 18.40 SUBAREA RUNOFF (CFS) = 46.73
EFFECTIVE AREA (ACRES) = 108.10 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
TOTAL AREA (ACRES) = 108.1 PEAK FLOW RATE (CFS) = 271.90

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 57.0 INCH PIPE IS 43.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 18.61
ESTIMATED PIPE DIAMETER (INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 271.90
PIPE TRAVEL TIME (MIN.) = 0.54 Tc (MIN.) = 11.10
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.) = 11.10
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.873
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	B	1.10	0.30	0.200	56
COMMERCIAL	B	12.70	0.30	0.100	56
PUBLIC PARK	B	0.80	0.30	0.850	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	4.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303
SUBAREA AREA (ACRES) = 20.40 SUBAREA RUNOFF (CFS) = 51.08
EFFECTIVE AREA (ACRES) = 128.50 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 128.5 PEAK FLOW RATE (CFS) = 316.42

A-27

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

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

MAINLINE Tc(MIN.) = 11.10
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.873 **A-27**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 1.20 0.30 0.100 56
 PUBLIC PARK B 1.50 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
 SUBAREA AREA(ACRES) = 2.80 SUBAREA RUNOFF(CFS) = 6.84
 EFFECTIVE AREA(ACRES) = 131.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 131.3 PEAK FLOW RATE(CFS) = 323.26

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

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

MAINLINE Tc(MIN.) = 11.10
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.873 **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 B 1.30 0.30 0.100 56
 COMMERCIAL B 12.60 0.30 0.100 56
 PUBLIC PARK B 1.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.10 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.238
 SUBAREA AREA(ACRES) = 18.20 SUBAREA RUNOFF(CFS) = 45.89
 EFFECTIVE AREA(ACRES) = 149.50 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA(ACRES) = 149.5 PEAK FLOW RATE(CFS) = 369.15

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 51.0 INCH PIPE IS 40.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 30.27
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 369.15
 PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 11.51

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.) = 11.51
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.822 **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 B 2.20 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.40 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.223
 SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 6.45
 EFFECTIVE AREA(ACRES) = 152.10 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA(ACRES) = 152.1 PEAK FLOW RATE(CFS) = 369.15
 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.) = 11.51
 RAINFALL INTENSITY(INCH/HR) = 2.82
 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.43
 EFFECTIVE STREAM AREA(ACRES) = 152.10
 TOTAL STREAM AREA(ACRES) = 152.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 369.15

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	436.54	11.63	2.808	0.30(0.09)	0.31	175.7	110.00
1	424.23	18.56	2.134	0.30(0.09)	0.29	227.3	100.00
2	369.15	11.51	2.822	0.30(0.13)	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	803.63	11.51	2.822	0.30(0.11)	0.37	326.0	120.00
2	803.72	11.63	2.808	0.30(0.11)	0.36	327.8	110.00
3	699.01	18.56	2.134	0.30(0.10)	0.34	379.4	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 803.72 Tc(MIN.) = 11.63
 EFFECTIVE AREA(ACRES) = 327.79 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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 93.0 INCH PIPE IS 70.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.99
 ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 803.72
 PIPE TRAVEL TIME(MIN.) = 1.19 Tc(MIN.) = 12.81
 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.) = 12.81
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.661
 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	B	1.80	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.40	0.30	0.900	56
COMMERCIAL	B	0.80	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.60	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524
 SUBAREA AREA(ACRES) = 6.80 SUBAREA RUNOFF(CFS) = 15.32
 EFFECTIVE AREA(ACRES) = 334.59 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 386.2 PEAK FLOW RATE(CFS) = 803.72
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

A-30

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

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

MAINLINE Tc(MIN.) = 12.81
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.661
 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	B	1.80	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.40	0.30	0.900	56
COMMERCIAL	B	0.80	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.60	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524
 SUBAREA AREA(ACRES) = 6.80 SUBAREA RUNOFF(CFS) = 15.32
 EFFECTIVE AREA(ACRES) = 334.59 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 386.2 PEAK FLOW RATE(CFS) = 803.72
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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 PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.344
 SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 10.82
 EFFECTIVE AREA(ACRES) = 339.29 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 390.9 PEAK FLOW RATE(CFS) = 803.72
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

A-31

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

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

MAINLINE Tc(MIN.) = 12.81
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.661
 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	B	4.70	0.30	0.100	56
PUBLIC PARK	B	1.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.90	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.80	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.386
 SUBAREA AREA(ACRES) = 13.70 SUBAREA RUNOFF(CFS) = 31.38
 EFFECTIVE AREA(ACRES) = 352.99 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 404.6 PEAK FLOW RATE(CFS) = 810.26

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** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	810.75	12.70	2.675	0.30(0.11)	0.37	351.2	120.00
2	810.26	12.81	2.661	0.30(0.11)	0.37	353.0	110.00
3	706.44	19.79	2.045	0.30(0.10)	0.35	404.6	100.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 810.75 Tc(MIN.) = 12.70
 AREA-AVERAGED Fm(INCH/HR) = 0.11 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.37 EFFECTIVE AREA(ACRES) = 351.24

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

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

MAINLINE Tc(MIN.) = 12.70
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.675 **A-31**
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" B 4.40 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.70 0.30 0.400 56
COMMERCIAL B 5.00 0.30 0.100 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 10.30 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.253
SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 48.19
EFFECTIVE AREA(ACRES) = 371.84 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 425.2 PEAK FLOW RATE(CFS) = 858.95

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

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

MAINLINE Tc(MIN.) = 12.70
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.675 **A-31**
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" B 1.30 0.30 0.600 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 3.90 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 2.30 0.30 0.400 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.487
SUBAREA AREA(ACRES) = 7.50 SUBAREA RUNOFF(CFS) = 17.07
EFFECTIVE AREA(ACRES) = 379.34 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 432.7 PEAK FLOW RATE(CFS) = 876.02

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 62.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.33

ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 876.02
PIPE TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 13.75
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.) = 13.75
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.545 **A-32**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.30 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 B 1.30 0.30 0.100 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.00 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.598
SUBAREA AREA(ACRES) = 7.00 SUBAREA RUNOFF(CFS) = 14.90
EFFECTIVE AREA(ACRES) = 386.34 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 439.7 PEAK FLOW RATE(CFS) = 876.02
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.) = 13.75
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.545 **A-32**
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" B 2.50 0.30 0.600 56
COMMERCIAL B 0.80 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.30 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.30 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.599
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 16.82
EFFECTIVE AREA(ACRES) = 394.24 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 447.6 PEAK FLOW RATE(CFS) = 876.02
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
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 3.207

OA-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
"OPEN BRUSH" B 1.50 0.30 1.000 66 9.31
NATURAL FAIR COVER
"WOODLAND, GRASS" B 0.40 0.30 1.000 65 9.31
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 4.97
TOTAL AREA (ACRES) = 1.90 PEAK FLOW RATE (CFS) = 4.97

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
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.957

OA-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
"OPEN BRUSH" B 4.90 0.30 1.000 66
NATURAL FAIR COVER
"WOODLAND, GRASS" B 2.40 0.30 1.000 65
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 13.70
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.30
AVERAGE FLOW DEPTH (FEET) = 0.85 TRAVEL TIME (MIN.) = 1.11
Tc (MIN.) = 10.43
SUBAREA AREA (ACRES) = 7.30 SUBAREA RUNOFF (CFS) = 17.46
EFFECTIVE AREA (ACRES) = 9.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 9.2 PEAK FLOW RATE (CFS) = 22.00

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.02 FLOW VELOCITY (FEET/SEC.) = 7.06
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 18.9 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 7.39
ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 22.00
PIPE TRAVEL TIME (MIN.) = 1.13 Tc (MIN.) = 11.56
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.) = 11.56
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.817

OA-6

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" B 5.10 0.30 1.000 66
NATURAL FAIR COVER
"WOODLAND, GRASS" B 4.00 0.30 1.000 65
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 20.61
EFFECTIVE AREA (ACRES) = 18.30 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 18.3 PEAK FLOW RATE (CFS) = 41.46

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 45.0 INCH PIPE IS 35.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 4.44
ESTIMATED PIPE DIAMETER (INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 41.46
PIPE TRAVEL TIME (MIN.) = 2.67 Tc (MIN.) = 14.23
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.) = 14.23 OA-7
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.486
 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	0.30	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	5.70	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.40	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.10	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	2.10	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 13.20 SUBAREA RUNOFF(CFS) = 25.97
 EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 61.97

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

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

MAINLINE Tc(MIN.) = 14.23 OA-7
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.486
 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					
"WOODLAND,GRASS"	B	0.20	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.39
 EFFECTIVE AREA(ACRES) = 31.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 31.7 PEAK FLOW RATE(CFS) = 62.36

 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 48.0 INCH PIPE IS 38.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.79
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 62.36
 PIPE TRAVEL TIME(MIN.) = 2.62 Tc(MIN.) = 16.84

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 155.00 = 2873.00 FEET.

 FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.84 OA-8
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.257
 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	1.60	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.60	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	1.80	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.50	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 6.50 SUBAREA RUNOFF(CFS) = 11.45
 EFFECTIVE AREA(ACRES) = 38.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 38.2 PEAK FLOW RATE(CFS) = 67.29

 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 23.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.70
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 67.29
 PIPE TRAVEL TIME(MIN.) = 0.90 Tc(MIN.) = 17.75
 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.) = 17.75 OA-9
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.192
 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	1.90	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	0.40	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.30	0.30	1.000	66

NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 4.50 0.30 1.000 63
 NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF" B 1.30 0.30 1.000 72
 NATURAL FAIR COVER
 "OPEN BRUSH" B 3.70 0.30 1.000 66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA (ACRES) = 13.10 SUBAREA RUNOFF (CFS) = 22.31
 EFFECTIVE AREA (ACRES) = 51.30 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 51.3 PEAK FLOW RATE (CFS) = 87.36

 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 33.0 INCH PIPE IS 26.2 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 17.29
 ESTIMATED PIPE DIAMETER (INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 87.36
 PIPE TRAVEL TIME (MIN.) = 5.98 Tc (MIN.) = 23.72
 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	87.36	23.72	1.851	0.30 (0.30)	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	876.02	13.75	2.545	0.30 (0.11)	0.37	394.2	120.00
2	875.16	13.87	2.531	0.30 (0.11)	0.37	396.0	110.00
3	757.54	20.89	1.987	0.30 (0.11)	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	949.30	13.75	2.545	0.30 (0.13)	0.42	424.0	120.00
2	948.59	13.87	2.531	0.30 (0.13)	0.42	426.0	110.00
3	841.22	20.89	1.987	0.30 (0.12)	0.41	492.8	100.00
4	790.20	23.72	1.851	0.30 (0.13)	0.42	498.9	150.00

TOTAL AREA (ACRES) = 498.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 949.30 Tc (MIN.) = 13.750
 EFFECTIVE AREA (ACRES) = 423.98 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 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.) = 13.75
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.545 **A-33**
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) 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" B 0.70 0.30 1.000 86
 NATURAL FAIR COVER
 "OPEN BRUSH" B 0.80 0.30 1.000 66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.971
 SUBAREA AREA (ACRES) = 8.90 SUBAREA RUNOFF (CFS) = 18.05
 EFFECTIVE AREA (ACRES) = 432.88 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 507.8 PEAK FLOW RATE (CFS) = 949.30
 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.) = 13.75
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.545 **A-33**
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 0.10 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.50 0.30 0.900 56
 NATURAL FAIR COVER
 "WOODLAND,GRASS" B 0.40 0.30 1.000 65
 NATURAL FAIR COVER
 "OPEN BRUSH" B 0.10 0.30 1.000 66
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.919
 SUBAREA AREA (ACRES) = 2.40 SUBAREA RUNOFF (CFS) = 4.90

EFFECTIVE AREA (ACRES) = 435.28 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 510.2 PEAK FLOW RATE (CFS) = 949.30
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====
 END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 510.2 TC (MIN.) = 13.75
 EFFECTIVE AREA (ACRES) = 435.28 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.432
 PEAK FLOW RATE (CFS) = 949.30

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	949.30	13.75	2.545	0.30 (0.13)	0.43	435.3	120.00
2	948.59	13.87	2.531	0.30 (0.13)	0.43	437.3	110.00
3	843.42	20.89	1.987	0.30 (0.13)	0.43	504.1	100.00
4	790.36	23.72	1.851	0.30 (0.13)	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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Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA A ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 100-YR EV AUGUST 2018 CCHIU *

FILE NAME: PA3A00EV.DAT
TIME/DATE OF STUDY: 15:29 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	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

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"	B	1.10	0.30	1.000	66	9.41

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 3.04
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 3.04

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) = 3.158

OA-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 "CHAPARRAL,BROADLEAF"	B	0.90	0.30	1.000	63
NATURAL FAIR COVER "OPEN BRUSH"	B	2.60	0.30	1.000	66
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.983
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.46
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.56
AVERAGE FLOW DEPTH(FEET) = 0.71 TRAVEL TIME(MIN.) = 1.15
Tc(MIN.) = 10.57
SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 10.82
EFFECTIVE AREA(ACRES) = 5.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
TOTAL AREA(ACRES) = 5.3 PEAK FLOW RATE(CFS) = 13.65

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.85 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) = 16.39

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.36
HALFSTREET FLOOD WIDTH(FEET) = 10.98
AVERAGE FLOW VELOCITY(FEET/SEC.) = 6.45
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.31
STREET FLOW TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 11.25
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.048

A-1

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	1.10	0.30	0.900	56
COMMERCIAL	B	1.00	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.519
SUBAREA AREA(ACRES) = 2.10 SUBAREA RUNOFF(CFS) = 5.47
EFFECTIVE AREA(ACRES) = 7.40 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 7.4 PEAK FLOW RATE(CFS) = 18.60

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.60
FLOW VELOCITY(FEET/SEC.) = 6.66 DEPTH*VELOCITY(FT*FT/SEC.) = 2.46
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) = 30.80
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.46

HALFSTREET FLOOD WIDTH(FEET) = 16.68
AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.75
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.65
STREET FLOW TRAVEL TIME(MIN.) = 1.43 Tc(MIN.) = 12.68
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.848

A-2

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	B	6.60	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.80	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.271
SUBAREA AREA(ACRES) = 9.80 SUBAREA RUNOFF(CFS) = 24.41
EFFECTIVE AREA(ACRES) = 17.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 17.2 PEAK FLOW RATE(CFS) = 41.67

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 18.87
FLOW VELOCITY(FEET/SEC.) = 6.18 DEPTH*VELOCITY(FT*FT/SEC.) = 3.09
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 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.32
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.67
PIPE TRAVEL TIME(MIN.) = 1.69 Tc(MIN.) = 14.38
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.) = 14.38
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.653

A-3

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	B	3.90	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.90	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.255

SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 12.99
EFFECTIVE AREA (ACRES) = 22.80 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 22.8 PEAK FLOW RATE (CFS) = 51.63

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

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

MAINLINE Tc (MIN.) = 14.38
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.653 **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 B 5.00 0.30 0.100 56
PUBLIC PARK B 2.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA (ACRES) = 9.20 SUBAREA RUNOFF (CFS) = 20.98
EFFECTIVE AREA (ACRES) = 32.00 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
TOTAL AREA (ACRES) = 32.0 PEAK FLOW RATE (CFS) = 72.61

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

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

MAINLINE Tc (MIN.) = 14.38
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.653 **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 1.80 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 4.25
EFFECTIVE AREA (ACRES) = 33.80 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
TOTAL AREA (ACRES) = 33.8 PEAK FLOW RATE (CFS) = 76.86

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 25.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 14.57

ESTIMATED PIPE DIAMETER (INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 76.86
PIPE TRAVEL TIME (MIN.) = 0.92 Tc (MIN.) = 15.30
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.) = 15.30
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.562 **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 B 7.60 0.30 0.100 56
PUBLIC PARK B 0.40 0.30 0.850 56
COMMERCIAL B 10.50 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.125
SUBAREA AREA (ACRES) = 21.60 SUBAREA RUNOFF (CFS) = 49.07
EFFECTIVE AREA (ACRES) = 55.40 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
TOTAL AREA (ACRES) = 55.4 PEAK FLOW RATE (CFS) = 123.15

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

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

MAINLINE Tc (MIN.) = 15.30
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.562 **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 B 12.10 0.30 0.100 56
PUBLIC PARK B 1.00 0.30 0.850 56
COMMERCIAL B 4.50 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.131
SUBAREA AREA (ACRES) = 24.40 SUBAREA RUNOFF (CFS) = 55.39
EFFECTIVE AREA (ACRES) = 79.80 AREA-AVERAGED Fm (INCH/HR) = 0.08
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.25
TOTAL AREA (ACRES) = 79.8 PEAK FLOW RATE (CFS) = 178.54

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 34.9 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 18.26
ESTIMATED PIPE DIAMETER (INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 178.54
PIPE TRAVEL TIME (MIN.) = 0.74 Tc (MIN.) = 16.03
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.) = 16.03
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.494
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 B 6.70 0.30 0.100 56
PUBLIC PARK B 0.10 0.30 0.850 56
COMMERCIAL B 2.50 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.106
SUBAREA AREA (ACRES) = 12.70 SUBAREA RUNOFF (CFS) = 28.15
EFFECTIVE AREA (ACRES) = 92.50 AREA-AVERAGED Fm (INCH/HR) = 0.07
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.23
TOTAL AREA (ACRES) = 92.5 PEAK FLOW RATE (CFS) = 201.85

A-8

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

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

MAINLINE Tc (MIN.) = 16.03
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.494
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 B 7.60 0.30 0.100 56
PUBLIC PARK B 0.30 0.30 0.850 56
COMMERCIAL B 4.70 0.30 0.100 56
PUBLIC PARK B 0.40 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.150
SUBAREA AREA (ACRES) = 20.90 SUBAREA RUNOFF (CFS) = 46.07
EFFECTIVE AREA (ACRES) = 113.40 AREA-AVERAGED Fm (INCH/HR) = 0.07
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
TOTAL AREA (ACRES) = 113.4 PEAK FLOW RATE (CFS) = 247.92

A-7

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 53.4 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 11.50
ESTIMATED PIPE DIAMETER (INCH) = 69.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 247.92
PIPE TRAVEL TIME (MIN.) = 1.35 Tc (MIN.) = 17.39
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.) = 17.39
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.383
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 B 2.80 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56
COMMERCIAL B 0.60 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.235
SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 17.27
EFFECTIVE AREA (ACRES) = 121.70 AREA-AVERAGED Fm (INCH/HR) = 0.07
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
TOTAL AREA (ACRES) = 121.7 PEAK FLOW RATE (CFS) = 253.79

A-18

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

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

MAINLINE Tc (MIN.) = 17.39
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.383
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 B 5.50 0.30 0.200 56
APARTMENTS B 3.20 0.30 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 19.02
EFFECTIVE AREA (ACRES) = 130.80 AREA-AVERAGED Fm (INCH/HR) = 0.07
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.22
TOTAL AREA (ACRES) = 130.8 PEAK FLOW RATE (CFS) = 272.81

A-9

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.) = 17.39
 RAINFALL INTENSITY(INCH/HR) = 2.38
 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.22
 EFFECTIVE STREAM AREA(ACRES) = 130.80
 TOTAL STREAM AREA(ACRES) = 130.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 272.81

 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 Tc(MIN.) = 5.417
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.610

A-10

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"	B	0.40	0.30	0.900	56	8.68
COMMERCIAL	B	0.30	0.30	0.100	56	5.42
PUBLIC PARK	B	1.30	0.30	0.850	56	8.61
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	1.00	0.30	0.900	56	8.68

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.798
 SUBAREA RUNOFF(CFS) = 11.80
 TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 11.80

 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) = 18.76
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.39
 HALFSTREET FLOOD WIDTH(FEET) = 12.54

AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.87
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.27
 STREET FLOW TRAVEL TIME(MIN.) = 1.47 Tc(MIN.) = 6.89
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.025

A-11

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.30	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
COMMERCIAL	B	1.00	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.223
 SUBAREA AREA(ACRES) = 3.90 SUBAREA RUNOFF(CFS) = 13.89
 EFFECTIVE AREA(ACRES) = 6.90 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 24.11

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 13.95
 FLOW VELOCITY(FEET/SEC.) = 6.25 DEPTH*VELOCITY(FT*FT/SEC.) = 2.57
 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) = 37.72

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.52
 HALFSTREET FLOOD WIDTH(FEET) = 19.80
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.10
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.63
 STREET FLOW TRAVEL TIME(MIN.) = 1.27 Tc(MIN.) = 8.16
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.657

A-12

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	5.00	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.20	0.30	0.900	56

COMMERCIAL B 1.00 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.335
 SUBAREA AREA (ACRES) = 8.50 SUBAREA RUNOFF (CFS) = 27.21
 EFFECTIVE AREA (ACRES) = 15.40 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
 TOTAL AREA (ACRES) = 15.4 PEAK FLOW RATE (CFS) = 49.03

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.56 HALFSTREET FLOOD WIDTH (FEET) = 21.99
 FLOW VELOCITY (FEET/SEC.) = 5.43 DEPTH*VELOCITY (FT*FT/SEC.) = 3.02
 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 21.9 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 14.22
 ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 49.03
 PIPE TRAVEL TIME (MIN.) = 0.82 Tc (MIN.) = 8.98
 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.) = 8.98
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.463
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.60	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.455
 SUBAREA AREA (ACRES) = 2.90 SUBAREA RUNOFF (CFS) = 8.68
 EFFECTIVE AREA (ACRES) = 18.30 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA (ACRES) = 18.3 PEAK FLOW RATE (CFS) = 55.03

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.) = 8.98
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.463

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	9.00	0.30	0.100	56
PUBLIC PARK	B	1.90	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	2.70	0.30	0.900	56
COMMERCIAL	B	4.10	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.313
 SUBAREA AREA (ACRES) = 18.00 SUBAREA RUNOFF (CFS) = 54.59
 EFFECTIVE AREA (ACRES) = 36.30 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
 TOTAL AREA (ACRES) = 36.3 PEAK FLOW RATE (CFS) = 109.62

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.) = 8.98
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.463
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	4.50	0.30	0.100	56
PUBLIC PARK	B	1.20	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	3.80	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.515
 SUBAREA AREA (ACRES) = 9.50 SUBAREA RUNOFF (CFS) = 28.29
 EFFECTIVE AREA (ACRES) = 45.80 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA (ACRES) = 45.8 PEAK FLOW RATE (CFS) = 137.91

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.) = 8.98
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.463
 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	5.30	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND, GRASS"	B	0.30	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 15.94
 EFFECTIVE AREA (ACRES) = 51.40 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 51.4 PEAK FLOW RATE (CFS) = 153.85

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 32.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.37
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 153.85
PIPE TRAVEL TIME(MIN.) = 0.88 Tc(MIN.) = 9.85
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.) = 9.85
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.286
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          B      11.00   0.30  0.100  56
PUBLIC PARK         B       1.80   0.30  0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B       1.50   0.30  0.900  56
COMMERCIAL          B       3.20   0.30  0.100  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.222
SUBAREA AREA(ACRES) = 20.90 SUBAREA RUNOFF(CFS) = 60.55
EFFECTIVE AREA(ACRES) = 72.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 72.3 PEAK FLOW RATE(CFS) = 206.19

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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 42.0 INCH PIPE IS 33.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.16
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 206.19
PIPE TRAVEL TIME(MIN.) = 0.74 Tc(MIN.) = 10.59
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.) = 10.59
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.155
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          B       5.10   0.30  0.100  56
PUBLIC PARK         B       1.90   0.30  0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B       3.60   0.30  0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.485
SUBAREA AREA(ACRES) = 16.20 SUBAREA RUNOFF(CFS) = 43.87
EFFECTIVE AREA(ACRES) = 88.50 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 88.5 PEAK FLOW RATE(CFS) = 241.53

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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.) = 10.59
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.155
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B       2.70   0.30  0.100  56
PUBLIC PARK         B       0.10   0.30  0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B       0.50   0.30  0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.244
SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 9.15
EFFECTIVE AREA(ACRES) = 91.80 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 91.8 PEAK FLOW RATE(CFS) = 250.68

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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.) = 10.59
RAINFALL INTENSITY(INCH/HR) = 3.15
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.40
EFFECTIVE STREAM AREA(ACRES) = 91.80
TOTAL STREAM AREA(ACRES) = 91.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 250.68

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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	272.81	17.39	2.383	0.30 (0.07)	0.22	130.8	100.00
2	250.68	10.59	3.155	0.30 (0.12)	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	472.19	10.59	3.155	0.30 (0.09)	0.32	171.5	110.00
2	459.72	17.39	2.383	0.30 (0.09)	0.29	222.6	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 472.19 Tc (MIN.) = 10.59
EFFECTIVE AREA (ACRES) = 171.47 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30 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 64.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 15.45
ESTIMATED PIPE DIAMETER (INCH) = 81.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 472.19
PIPE TRAVEL TIME (MIN.) = 0.97 Tc (MIN.) = 11.56
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.) = 11.56
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.002

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	B	3.60	0.30	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 12.57
EFFECTIVE AREA (ACRES) = 176.17 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
TOTAL AREA (ACRES) = 227.3 PEAK FLOW RATE (CFS) = 472.19
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.) = 11.56
RAINFALL INTENSITY (INCH/HR) = 3.00
AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA (ACRES) = 176.17
TOTAL STREAM AREA (ACRES) = 227.30
PEAK FLOW RATE (CFS) AT CONFLUENCE = 472.19

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	B	0.50	0.30	0.100	56	6.88
PUBLIC PARK	B	0.20	0.30	0.850	56	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	B	2.70	0.30	0.200	56	7.33
RESIDENTIAL						
".4 DWELLING/ACRE"	B	1.40	0.30	0.900	56	11.02
PUBLIC PARK	B	0.10	0.30	0.850	56	10.93
RESIDENTIAL						
"11+ DWELLINGS/ACRE"	B	1.30	0.30	0.200	56	7.33

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.381
SUBAREA RUNOFF (CFS) = 21.83
TOTAL AREA (ACRES) = 6.20 PEAK FLOW RATE (CFS) = 21.83

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"	B	0.20	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF (CFS) = 0.68
EFFECTIVE AREA (ACRES) = 6.40 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
TOTAL AREA (ACRES) = 6.4 PEAK FLOW RATE (CFS) = 22.51

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 15.7 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 10.32
ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 22.51
PIPE TRAVEL TIME (MIN.) = 0.69 Tc (MIN.) = 7.57
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.) = 7.57
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.816

A-21

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 5.40 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.40 0.30 0.900 56
COMMERCIAL B 0.70 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.60 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.423
SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 30.21
EFFECTIVE AREA (ACRES) = 15.50 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA (ACRES) = 15.5 PEAK FLOW RATE (CFS) = 51.50

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 23.3 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 12.57
ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 51.50
PIPE TRAVEL TIME (MIN.) = 1.37 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/ SCSSOIL AREA Fp Ap SCSS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 7.60 0.30 0.200 56
COMMERCIAL B 1.40 0.30 0.100 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 2.30 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 6.50 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 8.40 0.30 0.600 56
APARTMENTS B 0.50 0.30 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.491
SUBAREA AREA (ACRES) = 26.70 SUBAREA RUNOFF (CFS) = 79.93
EFFECTIVE AREA (ACRES) = 42.20 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 42.2 PEAK FLOW RATE (CFS) = 126.66

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/ SCSSOIL AREA Fp Ap SCSS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.30 0.30 0.100 56
PUBLIC PARK B 1.10 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 2.00 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.80 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.80 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.642
SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF (CFS) = 32.48
EFFECTIVE AREA (ACRES) = 53.20 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 53.2 PEAK FLOW RATE (CFS) = 159.14

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 40.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.60
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 159.14
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 9.23
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.) = 9.23
* 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 B 0.10 0.30 0.200 56
COMMERCIAL B 1.60 0.30 0.100 56
PUBLIC PARK B 0.20 0.30 0.850 56
APARTMENTS B 0.30 0.30 0.200 56
COMMERCIAL B 2.10 0.30 0.100 56
PUBLIC PARK B 0.60 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.231
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 14.74
EFFECTIVE AREA(ACRES) = 58.10 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 58.1 PEAK FLOW RATE(CFS) = 170.86

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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.) = 9.23
* 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" B 0.20 0.30 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.60
EFFECTIVE AREA(ACRES) = 58.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 58.3 PEAK FLOW RATE(CFS) = 171.46

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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 42.0 INCH PIPE IS 29.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.75
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 171.46
PIPE TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 10.12
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.) = 10.12
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.237
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 0.50 0.30 0.200 56
COMMERCIAL B 1.20 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.20 0.30 0.900 56
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 1.60 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.00 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.550
SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 21.01
EFFECTIVE AREA(ACRES) = 65.90 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 65.9 PEAK FLOW RATE(CFS) = 183.37

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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.) = 10.12
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.237
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 1.90 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.60 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.30 0.30 0.600 56
APARTMENTS B 5.00 0.30 0.200 56
PUBLIC PARK B 2.30 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.50 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 37.68
EFFECTIVE AREA(ACRES) = 79.50 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49

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A-25.1

TOTAL AREA (ACRES) = 79.5 PEAK FLOW RATE (CFS) = 221.04

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

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

MAINLINE Tc (MIN.) = 10.12 **A-25.1**
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.237

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" B 10.20 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA (ACRES) = 10.20 SUBAREA RUNOFF (CFS) = 28.06
EFFECTIVE AREA (ACRES) = 89.70 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 89.7 PEAK FLOW RATE (CFS) = 249.10

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 37.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 23.85
ESTIMATED PIPE DIAMETER (INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 249.10
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 **A-26**
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.168

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 5.90 0.30 0.200 56
COMMERCIAL B 0.10 0.30 0.100 56
RESIDENTIAL
" .4 DWELLING/ACRE" B 0.60 0.30 0.900 56
APARTMENTS B 6.00 0.30 0.200 56
COMMERCIAL B 1.10 0.30 0.100 56
RESIDENTIAL
" .4 DWELLING/ACRE" B 4.70 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.395
SUBAREA AREA (ACRES) = 18.40 SUBAREA RUNOFF (CFS) = 50.50
EFFECTIVE AREA (ACRES) = 108.10 AREA-AVERAGED Fm (INCH/HR) = 0.15

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
TOTAL AREA (ACRES) = 108.1 PEAK FLOW RATE (CFS) = 294.03

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 43.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 19.12
ESTIMATED PIPE DIAMETER (INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 294.03
PIPE TRAVEL TIME (MIN.) = 0.53 Tc (MIN.) = 11.04
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.) = 11.04 **A-27**
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.081

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.50 0.30 0.100 56
PUBLIC PARK B 0.20 0.30 0.850 56
APARTMENTS B 1.10 0.30 0.200 56
COMMERCIAL B 12.70 0.30 0.100 56
PUBLIC PARK B 0.80 0.30 0.850 56
RESIDENTIAL
" .4 DWELLING/ACRE" B 4.10 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.303
SUBAREA AREA (ACRES) = 20.40 SUBAREA RUNOFF (CFS) = 54.90
EFFECTIVE AREA (ACRES) = 128.50 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 128.5 PEAK FLOW RATE (CFS) = 340.48

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

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

MAINLINE Tc (MIN.) = 11.04 **A-27**
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.081

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.20 0.30 0.100 56
PUBLIC PARK B 1.50 0.30 0.850 56
RESIDENTIAL
" .4 DWELLING/ACRE" B 0.10 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.530

SUBAREA AREA (ACRES) = 2.80 SUBAREA RUNOFF (CFS) = 7.36
 EFFECTIVE AREA (ACRES) = 131.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 131.3 PEAK FLOW RATE (CFS) = 347.84

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

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

MAINLINE Tc (MIN.) = 11.04
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.081 **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 B 1.30 0.30 0.100 56
 COMMERCIAL B 12.60 0.30 0.100 56
 PUBLIC PARK B 1.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.10 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.238
 SUBAREA AREA (ACRES) = 18.20 SUBAREA RUNOFF (CFS) = 49.30
 EFFECTIVE AREA (ACRES) = 149.50 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 149.5 PEAK FLOW RATE (CFS) = 397.14

 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 40.2 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 31.25
 ESTIMATED PIPE DIAMETER (INCH) = 54.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 397.14
 PIPE TRAVEL TIME (MIN.) = 0.40 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) = 3.020 **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 B 2.20 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.40 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.223
 SUBAREA AREA (ACRES) = 2.60 SUBAREA RUNOFF (CFS) = 6.91
 EFFECTIVE AREA (ACRES) = 152.10 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 152.1 PEAK FLOW RATE (CFS) = 397.14
 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) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.43
 EFFECTIVE STREAM AREA (ACRES) = 152.10
 TOTAL STREAM AREA (ACRES) = 152.10
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 397.14

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	472.19	11.56	3.002	0.30 (0.09)	0.31	176.2	110.00
1	459.72	18.36	2.310	0.30 (0.09)	0.29	227.3	100.00
2	397.14	11.43	3.020	0.30 (0.13)	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	867.18	11.43	3.020	0.30 (0.11)	0.37	326.4	120.00
2	866.77	11.56	3.002	0.30 (0.11)	0.36	328.3	110.00
3	759.36	18.36	2.310	0.30 (0.10)	0.34	379.4	100.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE (CFS) = 867.18 Tc (MIN.) = 11.43
 EFFECTIVE AREA (ACRES) = 326.35 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 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 93.0 INCH PIPE IS 75.7 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 21.09
 ESTIMATED PIPE DIAMETER (INCH) = 93.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 867.18
 PIPE TRAVEL TIME (MIN.) = 1.18 Tc (MIN.) = 12.61
 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.) = 12.61 A-30
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.857
 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	B	1.80	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	1.40	0.30	0.900	56
COMMERCIAL	B	0.80	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	1.60	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.524
 SUBAREA AREA (ACRES) = 6.80 SUBAREA RUNOFF (CFS) = 16.52
 EFFECTIVE AREA (ACRES) = 333.15 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA (ACRES) = 386.2 PEAK FLOW RATE (CFS) = 867.18
 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.) = 12.61 A-31
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.857
 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) = 11.65
 EFFECTIVE AREA (ACRES) = 337.85 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37

TOTAL AREA (ACRES) = 390.9 PEAK FLOW RATE (CFS) = 867.18
 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.) = 12.61 A-31
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.857
 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	B	4.70	0.30	0.100	56
PUBLIC PARK	B	1.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.90	0.30	0.200	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.80	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.386
 SUBAREA AREA (ACRES) = 13.70 SUBAREA RUNOFF (CFS) = 33.80
 EFFECTIVE AREA (ACRES) = 351.55 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA (ACRES) = 404.6 PEAK FLOW RATE (CFS) = 868.93

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

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

=====

MAINLINE Tc (MIN.) = 12.61 A-31
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.857
 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"	B	4.40	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.70	0.30	0.400	56
COMMERCIAL	B	5.00	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	10.30	0.30	0.200	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.253
 SUBAREA AREA (ACRES) = 20.60 SUBAREA RUNOFF (CFS) = 51.56
 EFFECTIVE AREA (ACRES) = 372.15 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
 TOTAL AREA (ACRES) = 425.2 PEAK FLOW RATE (CFS) = 920.49

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

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

MAINLINE Tc(MIN.) = 12.61 **A-31**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.857
 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	1.30	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	3.90	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.487
 SUBAREA AREA(ACRES) = 7.50 SUBAREA RUNOFF(CFS) = 18.30
 EFFECTIVE AREA(ACRES) = 379.65 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
 TOTAL AREA(ACRES) = 432.7 PEAK FLOW RATE(CFS) = 938.79

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 67.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.49
 ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 938.79
 PIPE TRAVEL TIME(MIN.) = 1.04 Tc(MIN.) = 13.66
 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.) = 13.66 **A-32**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.731
 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	B	1.30	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	3.00	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.598

SUBAREA AREA(ACRES) = 7.00 SUBAREA RUNOFF(CFS) = 16.08
 EFFECTIVE AREA(ACRES) = 386.65 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 439.7 PEAK FLOW RATE(CFS) = 938.79
 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.) = 13.66 **A-32**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.731
 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	2.50	0.30	0.600	56
COMMERCIAL	B	0.80	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.30	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.30	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.599
 SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 18.14
 EFFECTIVE AREA(ACRES) = 394.55 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 447.6 PEAK FLOW RATE(CFS) = 938.79
 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**
 * 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"	B	1.50	0.30	1.000	66	9.31
NATURAL FAIR COVER						
"WOODLAND,GRASS"	B	0.40	0.30	1.000	65	9.31

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF(CFS) = 5.29
TOTAL AREA (ACRES) = 1.90 PEAK FLOW RATE (CFS) = 5.29

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) =	3.184		

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"	B	4.90	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND,GRASS"	B	2.40	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.77
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.35
AVERAGE FLOW DEPTH(FEET) = 0.88 TRAVEL TIME(MIN.) = 1.10
Tc(MIN.) = 10.42
SUBAREA AREA(ACRES) = 7.30 SUBAREA RUNOFF(CFS) = 18.95
EFFECTIVE AREA(ACRES) = 9.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 9.2 PEAK FLOW RATE(CFS) = 23.88

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.05 FLOW VELOCITY(FEET/SEC.) = 7.22
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	20.2 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	7.48		
ESTIMATED PIPE DIAMETER(INCH) =	27.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	23.88		
PIPE TRAVEL TIME(MIN.) =	1.12	Tc(MIN.) =	11.53
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.) = 11.53
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.006

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"	B	5.10	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND,GRASS"	B	4.00	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 22.16
EFFECTIVE AREA(ACRES) = 18.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 18.3 PEAK FLOW RATE(CFS) = 44.56

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	34.7 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	4.58		
ESTIMATED PIPE DIAMETER(INCH) =	48.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	44.56		
PIPE TRAVEL TIME(MIN.) =	2.59	Tc(MIN.) =	14.12
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.) = 14.12
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681

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"	B	0.30	0.30	1.000	63
NATURAL FAIR COVER "CHAPARRAL,NARROWLEAF"	B	5.70	0.30	1.000	72
NATURAL FAIR COVER "OPEN BRUSH"	B	3.40	0.30	1.000	66
NATURAL FAIR COVER "WOODLAND,GRASS"	B	0.10	0.30	1.000	65
NATURAL FAIR COVER "CHAPARRAL,NARROWLEAF"	B	2.10	0.30	1.000	72
NATURAL FAIR COVER "OPEN BRUSH"	B	1.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 13.20 SUBAREA RUNOFF(CFS) = 28.28
EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 67.49


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FLOW PROCESS FROM NODE 154.00 TO NODE 154.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.12
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.681
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"    B         0.20    0.30    1.000    65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 0.20    SUBAREA RUNOFF(CFS) = 0.43
EFFECTIVE AREA(ACRES) = 31.70    AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30    AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.7    PEAK FLOW RATE(CFS) = 67.92

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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 38.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.99
ESTIMATED PIPE DIAMETER(INCH) = 51.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 67.92
PIPE TRAVEL TIME(MIN.) = 2.53    Tc(MIN.) = 16.65
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 155.00 = 2873.00 FEET.

```

```
*****
FLOW PROCESS FROM NODE 155.00 TO NODE 155.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.65
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.442
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         1.60    0.30    1.000    63
NATURAL FAIR COVER
"OPEN BRUSH"        B         1.60    0.30    1.000    66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B         1.80    0.30    1.000    63
NATURAL FAIR COVER
"OPEN BRUSH"        B         1.50    0.30    1.000    66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 6.50    SUBAREA RUNOFF(CFS) = 12.53
EFFECTIVE AREA(ACRES) = 38.20    AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30    AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 38.2    PEAK FLOW RATE(CFS) = 73.63

```

OA-8

```
*****
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 25.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.85
ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 73.63
PIPE TRAVEL TIME(MIN.) = 0.89    Tc(MIN.) = 17.54
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.) = 17.54
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.371
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         1.90    0.30    1.000    63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B         0.40    0.30    1.000    72
NATURAL FAIR COVER
"OPEN BRUSH"        B         1.30    0.30    1.000    66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B         4.50    0.30    1.000    63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B         1.30    0.30    1.000    72
NATURAL FAIR COVER
"OPEN BRUSH"        B         3.70    0.30    1.000    66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 13.10    SUBAREA RUNOFF(CFS) = 24.41
EFFECTIVE AREA(ACRES) = 51.30    AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30    AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 51.3    PEAK FLOW RATE(CFS) = 95.60

```

OA-9

```
*****
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 25.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.02
ESTIMATED PIPE DIAMETER(INCH) = 36.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 95.60
PIPE TRAVEL TIME(MIN.) = 5.73    Tc(MIN.) = 23.28

```

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	95.60	23.28	2.020	0.30(0.30)	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	938.79	13.66	2.731	0.30(0.11)	0.37	394.6	120.00
2	938.06	13.79	2.717	0.30(0.11)	0.37	396.5	110.00
3	828.05	20.64	2.162	0.30(0.11)	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	1018.09	13.66	2.731	0.30(0.13)	0.42	424.7	120.00
2	1017.63	13.79	2.717	0.30(0.13)	0.42	426.9	110.00
3	919.83	20.64	2.162	0.30(0.12)	0.41	493.1	100.00
4	866.36	23.28	2.020	0.30(0.13)	0.42	498.9	150.00

TOTAL AREA (ACRES) = 498.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1018.09 Tc(MIN.) = 13.660
EFFECTIVE AREA(ACRES) = 424.66 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 13.66

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.731

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"	B	0.70	0.30	1.000	86

NATURAL FAIR COVER

"OPEN BRUSH" B 0.80 0.30 1.000 66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.971

SUBAREA AREA(ACRES) = 8.90 SUBAREA RUNOFF(CFS) = 19.54

EFFECTIVE AREA(ACRES) = 433.56 AREA-AVERAGED Fm(INCH/HR) = 0.13

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43

TOTAL AREA(ACRES) = 507.8 PEAK FLOW RATE(CFS) = 1018.09

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.) = 13.66

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.731

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 RESIDENTIAL ".4 DWELLING/ACRE"	B	0.10	0.30	0.850	56
NATURAL FAIR COVER "WOODLAND,GRASS"	B	0.40	0.30	1.000	65
NATURAL FAIR COVER "OPEN BRUSH"	B	0.10	0.30	1.000	66
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.919
SUBAREA AREA(ACRES) = 2.40 SUBAREA RUNOFF(CFS) = 5.30
EFFECTIVE AREA(ACRES) = 435.96 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 510.2 PEAK FLOW RATE(CFS) = 1020.74

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 510.2 TC(MIN.) = 13.66
EFFECTIVE AREA(ACRES) = 435.96 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.432
PEAK FLOW RATE(CFS) = 1020.74

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1020.74	13.66	2.731	0.30(0.13)	0.43	436.0	120.00
2	1020.32	13.79	2.717	0.30(0.13)	0.43	438.2	110.00
3	923.35	20.64	2.162	0.30(0.13)	0.43	504.4	100.00
4	867.79	23.28	2.020	0.30(0.13)	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

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA B ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 2-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3B02EV.DAT
TIME/DATE OF STUDY: 08:22 05/25/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 1.600
- 2) 10.00; 1.060
- 3) 15.00; 0.840
- 4) 20.00; 0.720
- 5) 25.00; 0.630
- 6) 30.00; 0.560
- 7) 40.00; 0.480
- 8) 50.00; 0.420
- 9) 60.00; 0.366
- 10) 90.00; 0.300
- 11) 120.00; 0.246
- 12) 180.00; 0.190
- 13) 360.00; 0.136
- 14) 1200.00; 0.080

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 HIKE (FT) (FT) (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:

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 200.00 TO NODE 201.00 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) = 412.00 DOWNSTREAM(FEET) = 402.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.935
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.499
SUBAREA Tc AND LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	-	0.30	0.60	0.100	0	5.94
RESIDENTIAL ".4 DWELLING/ACRE"	-	0.10	0.60	0.900	0	9.51
RESIDENTIAL "3-4 DWELLINGS/ACRE"	-	0.10	0.60	0.600	0	8.04
COMMERCIAL	-	0.30	0.60	0.100	0	5.94
RESIDENTIAL ".4 DWELLING/ACRE"	-	0.70	0.60	0.900	0	9.51
RESIDENTIAL "3-4 DWELLINGS/ACRE"	-	1.50	0.60	0.600	0	8.04

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.580
SUBAREA RUNOFF(CFS) = 3.11
TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 3.11

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 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) = 520.00 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) = 4.60
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.29
HALFSTREET FLOOD WIDTH(FEET) = 7.16
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.53
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.03
STREET FLOW TRAVEL TIME(MIN.) = 2.45 Tc(MIN.) = 8.39
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.234

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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
USER-DEFINED	-	0.60	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	0.40	0.60	0.600	-
USER-DEFINED	-	0.50	0.60	0.100	-
USER-DEFINED	-	0.50	0.60	0.200	-
USER-DEFINED	-	1.50	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.525
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 2.98
EFFECTIVE AREA(ACRES) = 6.60 AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 6.6 PEAK FLOW RATE(CFS) = 5.37

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.30 HALFSTREET FLOOD WIDTH(FEET) = 7.84
FLOW VELOCITY(FEET/SEC.) = 3.61 DEPTH*VELOCITY(FT*FT/SEC.) = 1.09
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 825.00 FEET.

FLOW PROCESS FROM NODE 202.00 TO NODE 202.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 8.39
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.234
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.40	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 3.40 SUBAREA RUNOFF(CFS) = 2.67
EFFECTIVE AREA(ACRES) = 10.00 AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.57
TOTAL AREA(ACRES) = 10.0 PEAK FLOW RATE(CFS) = 8.04

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FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 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) = 430.00 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) = 11.57
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.38
HALFSTREET FLOOD WIDTH(FEET) = 12.38
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.70
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.42
STREET FLOW TRAVEL TIME(MIN.) = 1.94 Tc(MIN.) = 10.33

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* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.046
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.60	0.100	-
USER-DEFINED	-	2.70	0.60	0.200	-
USER-DEFINED	-	0.90	0.60	0.900	-
USER-DEFINED	-	0.40	0.60	0.100	-
USER-DEFINED	-	3.60	0.60	0.200	-
USER-DEFINED	-	1.10	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.340
SUBAREA AREA(ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 7.05
EFFECTIVE AREA(ACRES) = 19.30 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 19.3 PEAK FLOW RATE(CFS) = 13.40

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.40 HALFSTREET FLOOD WIDTH(FEET) = 13.16
FLOW VELOCITY(FEET/SEC.) = 3.85 DEPTH*VELOCITY(FT*FT/SEC.) = 1.53
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 203.00 = 1255.00 FEET.

FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.33
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.046
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.00	0.60	0.100	-
USER-DEFINED	-	1.10	0.60	0.900	-
USER-DEFINED	-	2.10	0.60	0.100	-
USER-DEFINED	-	0.20	0.60	0.200	-
USER-DEFINED	-	4.40	0.60	0.900	-
USER-DEFINED	-	0.30	0.60	0.100	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.586
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 5.69
EFFECTIVE AREA(ACRES) = 28.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 28.4 PEAK FLOW RATE(CFS) = 19.08

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*****
FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 10.33
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.046
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         1.80     0.60     0.900    -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA(ACRES) = 1.80      SUBAREA RUNOFF(CFS) = 0.82
EFFECTIVE AREA(ACRES) = 30.20  AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 30.2      PEAK FLOW RATE(CFS) = 19.90

```

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```

*****
FLOW PROCESS FROM NODE 203.00 TO NODE 204.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 375.00 DOWNSTREAM(FEET) = 360.00
FLOW LENGTH(FEET) = 1242.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.42
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.90
PIPE TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 12.78
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 204.00 = 2497.00 FEET.

```

B-5

```

*****
FLOW PROCESS FROM NODE 204.00 TO NODE 204.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 12.78
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.937
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         0.90     0.60     0.100    -
USER-DEFINED        -         1.60     0.60     0.900    -
USER-DEFINED        -         0.10     0.60     0.100    -
USER-DEFINED        -         0.20     0.60     0.900    -
USER-DEFINED        -         0.20     0.60     0.100    -
USER-DEFINED        -         0.30     0.60     0.900    -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.609
SUBAREA AREA(ACRES) = 3.30      SUBAREA RUNOFF(CFS) = 1.70
EFFECTIVE AREA(ACRES) = 33.50  AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 33.5      PEAK FLOW RATE(CFS) = 19.90
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

```

```

FLOW PROCESS FROM NODE 204.00 TO NODE 205.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 360.00 DOWNSTREAM(FEET) = 350.00
FLOW LENGTH(FEET) = 937.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.98
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.90
PIPE TRAVEL TIME(MIN.) = 1.96 Tc(MIN.) = 14.74
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 3434.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 205.00 TO NODE 205.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.74
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.851
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         0.40     0.60     0.100    -
USER-DEFINED        -         1.00     0.60     0.900    -
USER-DEFINED        -         0.50     0.60     0.100    -
USER-DEFINED        -         1.10     0.60     0.900    -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.660
SUBAREA AREA(ACRES) = 3.00      SUBAREA RUNOFF(CFS) = 1.23
EFFECTIVE AREA(ACRES) = 36.50  AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 36.5      PEAK FLOW RATE(CFS) = 19.90
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

```

B-5.1

```

*****
FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 350.00 DOWNSTREAM(FEET) = 345.00
FLOW LENGTH(FEET) = 587.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.45
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.90
PIPE TRAVEL TIME(MIN.) = 1.31 Tc(MIN.) = 16.05
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 4021.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.05
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.815

```

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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
USER-DEFINED	-	0.30	0.60	0.100	-
USER-DEFINED	-	0.20	0.60	0.400	-
USER-DEFINED	-	0.40	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	0.30	0.60	0.400	-
USER-DEFINED	-	0.20	0.60	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.253
 SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 0.89
 EFFECTIVE AREA(ACRES) = 38.00 AREA-AVERAGED Fm(INCH/HR) = 0.32
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 38.0 PEAK FLOW RATE(CFS) = 19.90
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.05
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.815 B-6
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
 SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.05
 EFFECTIVE AREA(ACRES) = 38.10 AREA-AVERAGED Fm(INCH/HR) = 0.32
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 38.1 PEAK FLOW RATE(CFS) = 19.90
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 206.00 TO NODE 221.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 345.00 DOWNSTREAM(FEET) = 330.00
 FLOW LENGTH(FEET) = 1217.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.49
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 19.90
 PIPE TRAVEL TIME(MIN.) = 2.39 Tc(MIN.) = 18.44
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 221.00 = 5238.00 FEET.

 FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.44
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.757

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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
USER-DEFINED	-	7.70	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	0.200	-
USER-DEFINED	-	0.40	0.60	0.900	-
USER-DEFINED	-	0.20	0.60	0.400	-
USER-DEFINED	-	3.80	0.60	0.100	-
USER-DEFINED	-	0.40	0.60	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.135
 SUBAREA AREA(ACRES) = 12.80 SUBAREA RUNOFF(CFS) = 7.79
 EFFECTIVE AREA(ACRES) = 50.90 AREA-AVERAGED Fm(INCH/HR) = 0.26
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.43
 TOTAL AREA(ACRES) = 50.9 PEAK FLOW RATE(CFS) = 22.86

 FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.44
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.757 B-7
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.60	0.900	-
USER-DEFINED	-	0.10	0.60	0.500	-
USER-DEFINED	-	0.20	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.620
 SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 0.17
 EFFECTIVE AREA(ACRES) = 51.40 AREA-AVERAGED Fm(INCH/HR) = 0.26
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.43
 TOTAL AREA(ACRES) = 51.4 PEAK FLOW RATE(CFS) = 23.03

 FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.44
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.757 B-8
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	6.20	0.60	0.100	-
USER-DEFINED	-	1.30	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	0.50	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.120
 SUBAREA AREA(ACRES) = 8.20 SUBAREA RUNOFF(CFS) = 5.06
 EFFECTIVE AREA(ACRES) = 59.60 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 59.6 PEAK FLOW RATE(CFS) = 28.09

```
*****
FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 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.) = 18.44
RAINFALL INTENSITY(INCH/HR) = 0.76
AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.39
EFFECTIVE STREAM AREA(ACRES) = 59.60
TOTAL STREAM AREA(ACRES) = 59.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 28.09
```

```
*****
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) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 470.00 DOWNSTREAM(FEET) = 467.00
```

```
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.740
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.088
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.)
PUBLIC PARK - 0.80 0.60 0.850 0 12.58
RESIDENTIAL
".4 DWELLING/ACRE" - 0.10 0.60 0.900 0 12.68
RESIDENTIAL
"5-7 DWELLINGS/ACRE" - 1.50 0.60 0.500 0 10.13
RESIDENTIAL
"8-10 DWELLINGS/ACRE" - 0.20 0.60 0.400 0 9.74
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.615
SUBAREA RUNOFF(CFS) = 1.68
TOTAL AREA(ACRES) = 2.60 PEAK FLOW RATE(CFS) = 1.68
```

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```
*****
FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 467.00 DOWNSTREAM ELEVATION(FEET) = 466.00
STREET LENGTH(FEET) = 193.00 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) = 3.25
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.34
HALFSTREET FLOOD WIDTH(FEET) = 9.72
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.56
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.53
STREET FLOW TRAVEL TIME(MIN.) = 2.06 Tc(MIN.) = 11.80
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.981
```

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```
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.20 0.60 0.400 -
USER-DEFINED - 0.50 0.60 0.850 -
USER-DEFINED - 0.10 0.60 0.900 -
USER-DEFINED - 2.20 0.60 0.500 -
USER-DEFINED - 2.00 0.60 0.400 -
USER-DEFINED - 0.10 0.60 0.600 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.501
SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 3.12
EFFECTIVE AREA(ACRES) = 7.70 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 7.7 PEAK FLOW RATE(CFS) = 4.55
```

```
END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.37
FLOW VELOCITY(FEET/SEC.) = 1.69 DEPTH*VELOCITY(FT*FT/SEC.) = 0.62
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 523.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81
-----
```

```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.80
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.981
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.70 0.60 0.400 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.70 SUBAREA RUNOFF(CFS) = 0.47
EFFECTIVE AREA(ACRES) = 8.40 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 8.4 PEAK FLOW RATE(CFS) = 5.02
```

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```
*****
FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 62
-----
```

```
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 466.00 DOWNSTREAM ELEVATION(FEET) = 460.00
```


STREET LENGTH(FEET) = 324.00 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) = 7.06

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 10.43
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.03
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.06
STREET FLOW TRAVEL TIME(MIN.) = 1.78 Tc(MIN.) = 13.58
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.903

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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
USER-DEFINED	-	0.90	0.60	0.100	-
USER-DEFINED	-	0.40	0.60	0.850	-
USER-DEFINED	-	0.20	0.60	0.900	-
USER-DEFINED	-	4.00	0.60	0.500	-
USER-DEFINED	-	1.70	0.60	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.457
SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 4.07
EFFECTIVE AREA(ACRES) = 15.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 8.50

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 11.29
FLOW VELOCITY(FEET/SEC.) = 3.19 DEPTH*VELOCITY(FT*FT/SEC.) = 1.16
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 847.00 FEET.

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) = 460.00 DOWNSTREAM(FEET) = 405.00
FLOW LENGTH(FEET) = 508.00 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.) = 15.59
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.50
PIPE TRAVEL TIME(MIN.) = 0.54 Tc(MIN.) = 14.12
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 214.00 = 1355.00 FEET.

FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.12
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.879
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.200	-
USER-DEFINED	-	0.10	0.60	0.500	-
USER-DEFINED	-	3.10	0.60	0.400	-
USER-DEFINED	-	1.60	0.60	0.100	-
USER-DEFINED	-	0.60	0.60	0.850	-
USER-DEFINED	-	2.40	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.524
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 4.01
EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 12.18

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FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.12
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.879
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.500	-
USER-DEFINED	-	4.80	0.60	0.400	-
USER-DEFINED	-	0.30	0.60	0.900	-
USER-DEFINED	-	0.80	0.60	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.427
SUBAREA AREA(ACRES) = 6.00 SUBAREA RUNOFF(CFS) = 3.36
EFFECTIVE AREA(ACRES) = 29.50 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 29.5 PEAK FLOW RATE(CFS) = 15.54

B-12

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) = 405.00 DOWNSTREAM(FEET) = 400.00
FLOW LENGTH(FEET) = 376.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.15
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.54
PIPE TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 14.89
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 215.00 = 1731.00 FEET.

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.89
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.845

B-13

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.100	-
USER-DEFINED	-	0.60	0.60	0.850	-
USER-DEFINED	-	5.00	0.60	0.200	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	2.40	0.60	0.500	-
USER-DEFINED	-	0.10	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.349
SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 4.74
EFFECTIVE AREA (ACRES) = 37.80 AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 37.8 PEAK FLOW RATE (CFS) = 19.39

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.89
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.845

B-13

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.10	0.60	0.500	-
USER-DEFINED	-	0.10	0.60	0.500	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA (ACRES) = 4.20 SUBAREA RUNOFF (CFS) = 2.06
EFFECTIVE AREA (ACRES) = 42.00 AREA-AVERAGED Fm (INCH/HR) = 0.28
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 42.0 PEAK FLOW RATE (CFS) = 21.45

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.89
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.845

B-14

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.80	0.60	0.850	-
USER-DEFINED	-	2.50	0.60	0.200	-
USER-DEFINED	-	0.40	0.60	0.900	-
USER-DEFINED	-	1.50	0.60	0.600	-
USER-DEFINED	-	2.30	0.60	0.400	-
USER-DEFINED	-	1.20	0.60	0.850	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503
SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 4.25
EFFECTIVE AREA (ACRES) = 50.70 AREA-AVERAGED Fm (INCH/HR) = 0.28
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.47
TOTAL AREA (ACRES) = 50.7 PEAK FLOW RATE (CFS) = 25.70

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.89
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.845

B-14

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.00	0.60	0.200	-
USER-DEFINED	-	0.90	0.60	0.900	-
USER-DEFINED	-	0.50	0.60	0.600	-
USER-DEFINED	-	0.40	0.60	0.500	-
USER-DEFINED	-	4.80	0.60	0.400	-
USER-DEFINED	-	1.80	0.60	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.368
SUBAREA AREA (ACRES) = 11.40 SUBAREA RUNOFF (CFS) = 6.41
EFFECTIVE AREA (ACRES) = 62.10 AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.45
TOTAL AREA (ACRES) = 62.1 PEAK FLOW RATE (CFS) = 32.10

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.89
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.845

B-14

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA (ACRES) = 0.10 SUBAREA RUNOFF (CFS) = 0.03
EFFECTIVE AREA (ACRES) = 62.20 AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.45
TOTAL AREA (ACRES) = 62.2 PEAK FLOW RATE (CFS) = 32.13

FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 400.00 DOWNSTREAM (FEET) = 350.00
FLOW LENGTH (FEET) = 1800.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 12.88
ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 32.13
PIPE TRAVEL TIME(MIN.) = 2.33 Tc(MIN.) = 17.22
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 216.00 = 3531.00 FEET.

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.22
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.787 **B-15**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.50 0.60 0.100 -
USER-DEFINED - 0.50 0.60 0.850 -
USER-DEFINED - 1.40 0.60 0.900 -
USER-DEFINED - 5.70 0.60 0.400 -
USER-DEFINED - 0.50 0.60 0.850 -
USER-DEFINED - 0.70 0.60 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.508
SUBAREA AREA(ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 4.04
EFFECTIVE AREA(ACRES) = 71.50 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 71.5 PEAK FLOW RATE(CFS) = 32.91

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.22
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.787 **B-15**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.40 0.60 0.850 -
USER-DEFINED - 2.30 0.60 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 2.70 SUBAREA RUNOFF(CFS) = 1.23
EFFECTIVE AREA(ACRES) = 74.20 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 74.2 PEAK FLOW RATE(CFS) = 34.15

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.22
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.787 **B-16**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.30 0.60 0.850 -
USER-DEFINED - 2.40 0.60 0.900 -

USER-DEFINED - 0.80 0.60 0.500 -
USER-DEFINED - 4.70 0.60 0.400 -
USER-DEFINED - 2.00 0.60 0.900 -
USER-DEFINED - 0.90 0.60 0.500 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.644
SUBAREA AREA(ACRES) = 12.10 SUBAREA RUNOFF(CFS) = 4.36
EFFECTIVE AREA(ACRES) = 86.30 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 86.3 PEAK FLOW RATE(CFS) = 38.51

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.22
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.787 **B-16**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.10 0.60 0.400 -
USER-DEFINED - 1.40 0.60 0.500 -
USER-DEFINED - 1.00 0.60 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 2.14
EFFECTIVE AREA(ACRES) = 90.80 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 90.8 PEAK FLOW RATE(CFS) = 40.64

FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 350.00 DOWNSTREAM(FEET) = 340.00
FLOW LENGTH(FEET) = 886.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.60
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.64
PIPE TRAVEL TIME(MIN.) = 1.54 Tc(MIN.) = 18.76
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 217.00 = 4417.00 FEET.

FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.76
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.750 **B-17**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.30 0.60 0.850 -
USER-DEFINED - 0.40 0.60 0.200 -

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USER-DEFINED      -      1.80      0.60      0.200      -
USER-DEFINED      -      0.40      0.60      0.100      -
USER-DEFINED      -      2.20      0.60      0.850      -
USER-DEFINED      -      1.00      0.60      0.200      -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.460
SUBAREA AREA(ACRES) = 6.10      SUBAREA RUNOFF(CFS) = 2.60
EFFECTIVE AREA(ACRES) = 96.90      AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60      AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 96.9      PEAK FLOW RATE(CFS) = 40.64
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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MAINLINE Tc(MIN.) = 18.76
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.750
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
USER-DEFINED      -      5.20      0.60      0.100      -
USER-DEFINED      -      0.60      0.60      0.850      -
USER-DEFINED      -      8.60      0.60      0.200      -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.191
SUBAREA AREA(ACRES) = 14.40      SUBAREA RUNOFF(CFS) = 8.23
EFFECTIVE AREA(ACRES) = 111.30      AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.60      AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 111.3      PEAK FLOW RATE(CFS) = 48.46

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B-17

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*****
FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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MAINLINE Tc(MIN.) = 18.76
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.750
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
LAND USE      GROUP      (ACRES)      (INCH/HR)      (DECIMAL)      CN
USER-DEFINED      -      1.70      0.60      0.200      -
USER-DEFINED      -      4.30      0.60      0.100      -
USER-DEFINED      -      3.00      0.60      0.850      -
USER-DEFINED      -      10.30      0.60      0.200      -
USER-DEFINED      -      3.70      0.60      0.400      -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298
SUBAREA AREA(ACRES) = 23.00      SUBAREA RUNOFF(CFS) = 11.82
EFFECTIVE AREA(ACRES) = 134.30      AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.60      AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 134.3      PEAK FLOW RATE(CFS) = 60.28

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B-18

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*****
FLOW PROCESS FROM NODE 217.00 TO NODE 221.00 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) = 340.00      DOWNSTREAM(FEET) = 330.00
FLOW LENGTH(FEET) = 1266.00      MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.45
ESTIMATED PIPE DIAMETER(INCH) = 39.00      NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 60.28
PIPE TRAVEL TIME(MIN.) = 2.23      Tc(MIN.) = 20.99
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

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*****
FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 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.) = 20.99
RAINFALL INTENSITY(INCH/HR) = 0.70
AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA(ACRES) = 134.30
TOTAL STREAM AREA(ACRES) = 134.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 60.28

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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	28.09	18.44	0.757	0.60(0.23)	0.39	59.6	200.00
2	60.28	20.99	0.702	0.60(0.25)	0.42	134.3	210.00

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	87.54	18.44	0.757	0.60(0.25)	0.41	177.6	200.00
2	85.41	20.99	0.702	0.60(0.25)	0.41	193.9	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 87.54      Tc(MIN.) = 18.44
EFFECTIVE AREA(ACRES) = 177.59      AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.60      AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 193.9
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

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*****
FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 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) = 330.00      DOWNSTREAM(FEET) = 280.00
FLOW LENGTH(FEET) = 278.00      MANNING'S N = 0.013

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DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.9 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 33.00
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 87.54
 PIPE TRAVEL TIME (MIN.) = 0.14 Tc (MIN.) = 18.58
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 222.00 = 5961.00 FEET.

 FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 18.58 **B-19**
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.754
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.80	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	0.900	-
USER-DEFINED	-	1.90	0.60	0.100	-
USER-DEFINED	-	1.30	0.60	1.000	-
USER-DEFINED	-	2.20	0.60	0.900	-
USER-DEFINED	-	2.50	0.60	0.500	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.517
 SUBAREA AREA (ACRES) = 10.00 SUBAREA RUNOFF (CFS) = 3.99
 EFFECTIVE AREA (ACRES) = 187.59 AREA-AVERAGED Fm (INCH/HR) = 0.25
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.41
 TOTAL AREA (ACRES) = 203.9 PEAK FLOW RATE (CFS) = 87.54
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 18.58 **B-19**
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.754
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	4.70	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	1.000	-
USER-DEFINED	-	4.00	0.60	0.900	-
USER-DEFINED	-	0.60	0.60	0.500	-
USER-DEFINED	-	0.40	0.60	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.512
 SUBAREA AREA (ACRES) = 10.10 SUBAREA RUNOFF (CFS) = 4.06
 EFFECTIVE AREA (ACRES) = 197.69 AREA-AVERAGED Fm (INCH/HR) = 0.25
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.42
 TOTAL AREA (ACRES) = 214.0 PEAK FLOW RATE (CFS) = 89.38

 FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 18.58
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.754 **B-19**
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	0.10	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.986
 SUBAREA AREA (ACRES) = 0.70 SUBAREA RUNOFF (CFS) = 0.10
 EFFECTIVE AREA (ACRES) = 198.39 AREA-AVERAGED Fm (INCH/HR) = 0.25
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.42
 TOTAL AREA (ACRES) = 214.7 PEAK FLOW RATE (CFS) = 89.48

END OF STUDY SUMMARY:
 TOTAL AREA (ACRES) = 214.7 TC (MIN.) = 18.58
 EFFECTIVE AREA (ACRES) = 198.39 AREA-AVERAGED Fm (INCH/HR) = 0.25
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.422
 PEAK FLOW RATE (CFS) = 89.48

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	89.48	18.58	0.754	0.60 (0.25)	0.42	198.4	200.00
2	86.35	21.13	0.700	0.60 (0.25)	0.42	214.7	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 1264

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA B ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 5-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3B05EV.DAT
TIME/DATE OF STUDY: 08:22 05/25/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 5.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 2.180
- 2) 10.00; 1.510
- 3) 15.00; 1.200
- 4) 20.00; 1.020
- 5) 25.00; 0.900
- 6) 30.00; 0.830
- 7) 40.00; 0.690
- 8) 50.00; 0.610
- 9) 60.00; 0.550
- 10) 90.00; 0.440
- 11) 120.00; 0.370
- 12) 180.00; 0.310
- 13) 360.00; 0.210
- 14) 1200.00; 0.090

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) (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

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 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) = 412.00 DOWNSTREAM(FEET) = 402.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.935
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.055

B-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.)
COMMERCIAL	-	0.30	0.50	0.100	0	5.94
RESIDENTIAL ".4 DWELLING/ACRE"	-	0.10	0.50	0.900	0	9.51
RESIDENTIAL "3-4 DWELLINGS/ACRE"	-	0.10	0.50	0.600	0	8.04
COMMERCIAL	-	0.30	0.50	0.100	0	5.94
RESIDENTIAL ".4 DWELLING/ACRE"	-	0.70	0.50	0.900	0	9.51
RESIDENTIAL "3-4 DWELLINGS/ACRE"	-	1.50	0.50	0.600	0	8.04

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.580
SUBAREA RUNOFF(CFS) = 4.76
TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 4.76

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 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) = 520.00 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) = 7.18
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.33
 HALFSTREET FLOOD WIDTH(FEET) = 9.16
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.81
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.24
 STREET FLOW TRAVEL TIME(MIN.) = 2.27 Tc(MIN.) = 8.21 **B-2**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.750

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	0.40	0.50	0.600	-
USER-DEFINED	-	0.50	0.50	0.100	-
USER-DEFINED	-	0.50	0.50	0.200	-
USER-DEFINED	-	1.50	0.50	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.525
 SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 4.82
 EFFECTIVE AREA(ACRES) = 6.60 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.55
 TOTAL AREA(ACRES) = 6.6 PEAK FLOW RATE(CFS) = 8.76

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 10.04
 FLOW VELOCITY(FEET/SEC.) = 4.00 DEPTH*VELOCITY(FT*FT/SEC.) = 1.37
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 825.00 FEET.

 FLOW PROCESS FROM NODE 202.00 TO NODE 202.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 8.21 **B-2**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.750
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.40	0.50	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 3.40 SUBAREA RUNOFF(CFS) = 4.44
 EFFECTIVE AREA(ACRES) = 10.00 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.57
 TOTAL AREA(ACRES) = 10.0 PEAK FLOW RATE(CFS) = 13.20

 FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 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) = 430.00 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) = 18.84
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.44
 HALFSTREET FLOOD WIDTH(FEET) = 15.27
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.14
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.80
 STREET FLOW TRAVEL TIME(MIN.) = 1.73 Tc(MIN.) = 9.94 **B-3**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.518

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	2.70	0.50	0.200	-
USER-DEFINED	-	0.90	0.50	0.900	-
USER-DEFINED	-	0.40	0.50	0.100	-
USER-DEFINED	-	3.60	0.50	0.200	-
USER-DEFINED	-	1.10	0.50	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.340
 SUBAREA AREA(ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 11.28
 EFFECTIVE AREA(ACRES) = 19.30 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 19.3 PEAK FLOW RATE(CFS) = 22.39

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45 HALFSTREET FLOOD WIDTH(FEET) = 16.37
 FLOW VELOCITY(FEET/SEC.) = 4.33 DEPTH*VELOCITY(FT*FT/SEC.) = 1.97
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 203.00 = 1255.00 FEET.

 FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 9.94 **B-4**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.518
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.00	0.50	0.100	-
USER-DEFINED	-	1.10	0.50	0.900	-
USER-DEFINED	-	2.10	0.50	0.100	-
USER-DEFINED	-	0.20	0.50	0.200	-
USER-DEFINED	-	4.40	0.50	0.900	-
USER-DEFINED	-	0.30	0.50	0.100	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.586
 SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 10.03
 EFFECTIVE AREA(ACRES) = 28.40 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 28.4 PEAK FLOW RATE(CFS) = 32.42


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*****
FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 9.94
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.518
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         1.80     0.50     0.900    -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA(ACRES) = 1.80      SUBAREA RUNOFF(CFS) = 1.73
EFFECTIVE AREA(ACRES) = 30.20  AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 30.2      PEAK FLOW RATE(CFS) = 34.15

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B-4

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*****
FLOW PROCESS FROM NODE 203.00 TO NODE 204.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 375.00  DOWNSTREAM(FEET) = 360.00
FLOW LENGTH(FEET) = 1242.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.67
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.15
PIPE TRAVEL TIME(MIN.) = 2.14  Tc(MIN.) = 12.08
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 204.00 = 2497.00 FEET.

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*****
FLOW PROCESS FROM NODE 204.00 TO NODE 204.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 12.08
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.381
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         0.90     0.50     0.100    -
USER-DEFINED        -         1.60     0.50     0.900    -
USER-DEFINED        -         0.10     0.50     0.100    -
USER-DEFINED        -         0.20     0.50     0.900    -
USER-DEFINED        -         0.20     0.50     0.100    -
USER-DEFINED        -         0.30     0.50     0.900    -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.609
SUBAREA AREA(ACRES) = 3.30      SUBAREA RUNOFF(CFS) = 3.20
EFFECTIVE AREA(ACRES) = 33.50  AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 33.5      PEAK FLOW RATE(CFS) = 34.15
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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B-5

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FLOW PROCESS FROM NODE 204.00 TO NODE 205.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 360.00  DOWNSTREAM(FEET) = 350.00
FLOW LENGTH(FEET) = 937.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.19
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.15
PIPE TRAVEL TIME(MIN.) = 1.70  Tc(MIN.) = 13.78
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 3434.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 205.00 TO NODE 205.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 13.78
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.276
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         0.40     0.50     0.100    -
USER-DEFINED        -         1.00     0.50     0.900    -
USER-DEFINED        -         0.50     0.50     0.100    -
USER-DEFINED        -         1.10     0.50     0.900    -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.660
SUBAREA AREA(ACRES) = 3.00      SUBAREA RUNOFF(CFS) = 2.55
EFFECTIVE AREA(ACRES) = 36.50  AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 36.5      PEAK FLOW RATE(CFS) = 34.15
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

```

B-5.1

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*****
FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

```

```

ELEVATION DATA: UPSTREAM(FEET) = 350.00  DOWNSTREAM(FEET) = 345.00
FLOW LENGTH(FEET) = 587.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.33
ESTIMATED PIPE DIAMETER(INCH) = 30.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.15
PIPE TRAVEL TIME(MIN.) = 1.18  Tc(MIN.) = 14.96
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 4021.00 FEET.

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*****
FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

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MAINLINE Tc(MIN.) = 14.96
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.203

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B-6

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.30	0.50	0.100	-
USER-DEFINED	-	0.20	0.50	0.400	-
USER-DEFINED	-	0.40	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	0.30	0.50	0.400	-
USER-DEFINED	-	0.20	0.50	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.253
SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 1.45
EFFECTIVE AREA(ACRES) = 38.00 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 38.0 PEAK FLOW RATE(CFS) = 34.15
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.96
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.203
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.09
EFFECTIVE AREA(ACRES) = 38.10 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 38.1 PEAK FLOW RATE(CFS) = 34.15
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

B-6

FLOW PROCESS FROM NODE 206.00 TO NODE 221.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 345.00 DOWNSTREAM(FEET) = 330.00
FLOW LENGTH(FEET) = 1217.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.76
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.15
PIPE TRAVEL TIME(MIN.) = 2.08 Tc(MIN.) = 17.03
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 221.00 = 5238.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.03
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.127

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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
USER-DEFINED	-	7.70	0.50	0.100	-
USER-DEFINED	-	0.30	0.50	0.200	-
USER-DEFINED	-	0.40	0.50	0.900	-
USER-DEFINED	-	0.20	0.50	0.400	-
USER-DEFINED	-	3.80	0.50	0.100	-
USER-DEFINED	-	0.40	0.50	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.135
SUBAREA AREA(ACRES) = 12.80 SUBAREA RUNOFF(CFS) = 12.20
EFFECTIVE AREA(ACRES) = 50.90 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 50.9 PEAK FLOW RATE(CFS) = 41.75

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.03
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.127
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	0.10	0.50	0.500	-
USER-DEFINED	-	0.20	0.50	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.620
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 0.37
EFFECTIVE AREA(ACRES) = 51.40 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 51.4 PEAK FLOW RATE(CFS) = 42.12

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FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.03
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.127
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	6.20	0.50	0.100	-
USER-DEFINED	-	1.30	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	0.50	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.120
SUBAREA AREA(ACRES) = 8.20 SUBAREA RUNOFF(CFS) = 7.87
EFFECTIVE AREA(ACRES) = 59.60 AREA-AVERAGED Fm(INCH/HR) = 0.19
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 59.6 PEAK FLOW RATE(CFS) = 49.99

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*****
FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 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.) = 17.03
RAINFALL INTENSITY(INCH/HR) = 1.13
AREA-AVERAGED Fm(INCH/HR) = 0.19
AREA-AVERAGED Fp(INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.39
EFFECTIVE STREAM AREA(ACRES) = 59.60
TOTAL STREAM AREA(ACRES) = 59.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 49.99

*****
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) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 470.00 DOWNSTREAM(FEET) = 467.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.740
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.545
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.)
PUBLIC PARK - 0.80 0.50 0.850 0 12.58
RESIDENTIAL
".4 DWELLING/ACRE" - 0.10 0.50 0.900 0 12.68
RESIDENTIAL
"5-7 DWELLINGS/ACRE" - 1.50 0.50 0.500 0 10.13
RESIDENTIAL
"8-10 DWELLINGS/ACRE" - 0.20 0.50 0.400 0 9.74
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.615
SUBAREA RUNOFF(CFS) = 2.89
TOTAL AREA(ACRES) = 2.60 PEAK FLOW RATE(CFS) = 2.89

*****
FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 467.00 DOWNSTREAM ELEVATION(FEET) = 466.00
STREET LENGTH(FEET) = 193.00 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

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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) = 5.56
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.46
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.76
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.68
STREET FLOW TRAVEL TIME(MIN.) = 1.83 Tc(MIN.) = 11.57
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.413
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.20 0.50 0.400 -
USER-DEFINED - 0.50 0.50 0.850 -
USER-DEFINED - 0.10 0.50 0.900 -
USER-DEFINED - 2.20 0.50 0.500 -
USER-DEFINED - 2.00 0.50 0.400 -
USER-DEFINED - 0.10 0.50 0.600 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.501
SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 5.33
EFFECTIVE AREA(ACRES) = 7.70 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 7.7 PEAK FLOW RATE(CFS) = 7.92

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.49
FLOW VELOCITY(FEET/SEC.) = 1.91 DEPTH*VELOCITY(FT*FT/SEC.) = 0.81
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 523.00 FEET.

*****
FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 11.57
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.413
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.70 0.50 0.400 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.70 SUBAREA RUNOFF(CFS) = 0.76
EFFECTIVE AREA(ACRES) = 8.40 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 8.4 PEAK FLOW RATE(CFS) = 8.68

*****
FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 466.00 DOWNSTREAM ELEVATION(FEET) = 460.00

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STREET LENGTH(FEET) = 324.00 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) = 12.21
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.40
HALFSTREET FLOOD WIDTH(FEET) = 13.32
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.43
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.37
STREET FLOW TRAVEL TIME(MIN.) = 1.57 Tc(MIN.) = 13.14
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.315

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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
USER-DEFINED	-	0.90	0.50	0.100	-
USER-DEFINED	-	0.40	0.50	0.850	-
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	4.00	0.50	0.500	-
USER-DEFINED	-	1.70	0.50	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.457
SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 7.04
EFFECTIVE AREA(ACRES) = 15.60 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 14.99

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.49
FLOW VELOCITY(FEET/SEC.) = 3.62 DEPTH*VELOCITY(FT*FT/SEC.) = 1.53
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 847.00 FEET.

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) = 460.00 DOWNSTREAM(FEET) = 405.00
FLOW LENGTH(FEET) = 508.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.14
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.99
PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 13.61
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 214.00 = 1355.00 FEET.

FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 13.61
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.286
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.500	-
USER-DEFINED	-	3.10	0.50	0.400	-
USER-DEFINED	-	1.60	0.50	0.100	-
USER-DEFINED	-	0.60	0.50	0.850	-
USER-DEFINED	-	2.40	0.50	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.524
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 7.28
EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 21.87

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FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 13.61
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.286
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.500	-
USER-DEFINED	-	4.80	0.50	0.400	-
USER-DEFINED	-	0.30	0.50	0.900	-
USER-DEFINED	-	0.80	0.50	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.427
SUBAREA AREA(ACRES) = 6.00 SUBAREA RUNOFF(CFS) = 5.79
EFFECTIVE AREA(ACRES) = 29.50 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 29.5 PEAK FLOW RATE(CFS) = 27.66

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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) = 405.00 DOWNSTREAM(FEET) = 400.00
FLOW LENGTH(FEET) = 376.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.50
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.66
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 14.27
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 215.00 = 1731.00 FEET.

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.27
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.245 **B-13**

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.10 0.50 0.100 -
USER-DEFINED - 0.60 0.50 0.850 -
USER-DEFINED - 5.00 0.50 0.200 -
USER-DEFINED - 0.10 0.50 0.900 -
USER-DEFINED - 2.40 0.50 0.500 -
USER-DEFINED - 0.10 0.50 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.349
SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 8.00
EFFECTIVE AREA (ACRES) = 37.80 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 37.8 PEAK FLOW RATE (CFS) = 34.57

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.27
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.245 **B-13**

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 4.10 0.50 0.500 -
USER-DEFINED - 0.10 0.50 0.500 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA AREA (ACRES) = 4.20 SUBAREA RUNOFF (CFS) = 3.76
EFFECTIVE AREA (ACRES) = 42.00 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 42.0 PEAK FLOW RATE (CFS) = 38.33

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.27
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.245 **B-14**

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.80 0.50 0.850 -
USER-DEFINED - 2.50 0.50 0.200 -
USER-DEFINED - 0.40 0.50 0.900 -
USER-DEFINED - 1.50 0.50 0.600 -
USER-DEFINED - 2.30 0.50 0.400 -
USER-DEFINED - 1.20 0.50 0.850 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503
SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 7.78
EFFECTIVE AREA (ACRES) = 50.70 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.47
TOTAL AREA (ACRES) = 50.7 PEAK FLOW RATE (CFS) = 46.11

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.27
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.245 **B-14**

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 3.00 0.50 0.200 -
USER-DEFINED - 0.90 0.50 0.900 -
USER-DEFINED - 0.50 0.50 0.600 -
USER-DEFINED - 0.40 0.50 0.500 -
USER-DEFINED - 4.80 0.50 0.400 -
USER-DEFINED - 1.80 0.50 0.200 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.368
SUBAREA AREA (ACRES) = 11.40 SUBAREA RUNOFF (CFS) = 10.89
EFFECTIVE AREA (ACRES) = 62.10 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.45
TOTAL AREA (ACRES) = 62.1 PEAK FLOW RATE (CFS) = 57.01

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.27
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.245 **B-14**

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.10 0.50 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA (ACRES) = 0.10 SUBAREA RUNOFF (CFS) = 0.07
EFFECTIVE AREA (ACRES) = 62.20 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.45
TOTAL AREA (ACRES) = 62.2 PEAK FLOW RATE (CFS) = 57.08

FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 400.00 DOWNSTREAM (FEET) = 350.00
FLOW LENGTH (FEET) = 1800.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 14.91
ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 57.08
PIPE TRAVEL TIME(MIN.) = 2.01 Tc(MIN.) = 16.28
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 216.00 = 3531.00 FEET.

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.28
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.154 **B-15**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.50 0.50 0.100 -
USER-DEFINED - 0.50 0.50 0.850 -
USER-DEFINED - 1.40 0.50 0.900 -
USER-DEFINED - 5.70 0.50 0.400 -
USER-DEFINED - 0.50 0.50 0.850 -
USER-DEFINED - 0.70 0.50 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.508
SUBAREA AREA(ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 7.53
EFFECTIVE AREA(ACRES) = 71.50 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 71.5 PEAK FLOW RATE(CFS) = 59.49

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.28
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.154 **B-15**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.40 0.50 0.850 -
USER-DEFINED - 2.30 0.50 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 2.70 SUBAREA RUNOFF(CFS) = 2.24
EFFECTIVE AREA(ACRES) = 74.20 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 74.2 PEAK FLOW RATE(CFS) = 61.73

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.28
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.154 **B-16**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.30 0.50 0.850 -
USER-DEFINED - 2.40 0.50 0.900 -

USER-DEFINED - 0.80 0.50 0.500 -
USER-DEFINED - 4.70 0.50 0.400 -
USER-DEFINED - 2.00 0.50 0.900 -
USER-DEFINED - 0.90 0.50 0.500 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.644
SUBAREA AREA(ACRES) = 12.10 SUBAREA RUNOFF(CFS) = 9.06
EFFECTIVE AREA(ACRES) = 86.30 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 86.3 PEAK FLOW RATE(CFS) = 70.78

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.28
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.154 **B-16**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.10 0.50 0.400 -
USER-DEFINED - 1.40 0.50 0.500 -
USER-DEFINED - 1.00 0.50 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 3.80
EFFECTIVE AREA(ACRES) = 90.80 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 90.8 PEAK FLOW RATE(CFS) = 74.58

FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 350.00 DOWNSTREAM(FEET) = 340.00
FLOW LENGTH(FEET) = 886.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.35
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 74.58
PIPE TRAVEL TIME(MIN.) = 1.30 Tc(MIN.) = 17.58
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 217.00 = 4417.00 FEET.

FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.58
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.107 **B-17**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.30 0.50 0.850 -
USER-DEFINED - 0.40 0.50 0.200 -

```

USER-DEFINED          -      1.80    0.50    0.200    -
USER-DEFINED          -      0.40    0.50    0.100    -
USER-DEFINED          -      2.20    0.50    0.850    -
USER-DEFINED          -      1.00    0.50    0.200    -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.460
SUBAREA AREA(ACRES) = 6.10    SUBAREA RUNOFF(CFS) = 4.82
EFFECTIVE AREA(ACRES) = 96.90    AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.50    AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 96.9    PEAK FLOW RATE(CFS) = 75.57

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FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 17.58
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.107
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -      5.20    0.50    0.100    -
USER-DEFINED        -      0.60    0.50    0.850    -
USER-DEFINED        -      8.60    0.50    0.200    -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.191
SUBAREA AREA(ACRES) = 14.40    SUBAREA RUNOFF(CFS) = 13.11
EFFECTIVE AREA(ACRES) = 111.30    AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.50    AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 111.3    PEAK FLOW RATE(CFS) = 88.68

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B-17

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FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 17.58
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.107
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -      1.70    0.50    0.200    -
USER-DEFINED        -      4.30    0.50    0.100    -
USER-DEFINED        -      3.00    0.50    0.850    -
USER-DEFINED        -     10.30    0.50    0.200    -
USER-DEFINED        -      3.70    0.50    0.400    -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298
SUBAREA AREA(ACRES) = 23.00    SUBAREA RUNOFF(CFS) = 19.83
EFFECTIVE AREA(ACRES) = 134.30    AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.50    AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 134.3    PEAK FLOW RATE(CFS) = 108.51

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B-18

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*****
FLOW PROCESS FROM NODE 217.00 TO NODE 221.00 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) = 340.00 DOWNSTREAM(FEET) = 330.00
FLOW LENGTH(FEET) = 1266.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.90
ESTIMATED PIPE DIAMETER(INCH) = 48.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 108.51
PIPE TRAVEL TIME(MIN.) = 1.94    Tc(MIN.) = 19.52
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

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FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 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.) = 19.52
RAINFALL INTENSITY(INCH/HR) = 1.04
AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA(ACRES) = 134.30
TOTAL STREAM AREA(ACRES) = 134.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 108.51

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** CONFLUENCE DATA **
STREAM    Q    Tc  Intensity  Fp(Fm)    Ap    Ae    HEADWATER
NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1        49.99 17.03  1.127  0.50( 0.19) 0.39  59.6  200.00
2       108.51 19.52  1.037  0.50( 0.21) 0.42  134.3  210.00

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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       154.92 17.03  1.127  0.50( 0.20) 0.41  176.8  200.00
2       153.71 19.52  1.037  0.50( 0.20) 0.41  193.9  210.00

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COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 154.92    Tc(MIN.) = 17.03
EFFECTIVE AREA(ACRES) = 176.82    AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.50    AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 193.9
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

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*****
FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 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) = 330.00 DOWNSTREAM(FEET) = 280.00
FLOW LENGTH(FEET) = 278.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.1 INCHES

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PIPE-FLOW VELOCITY (FEET/SEC.) = 38.22
 ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 154.92
 PIPE TRAVEL TIME (MIN.) = 0.12 Tc (MIN.) = 17.16
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 222.00 = 5961.00 FEET.

 FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 17.16
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.122
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.80	0.50	0.100	-
USER-DEFINED	-	0.30	0.50	0.900	-
USER-DEFINED	-	1.90	0.50	0.100	-
USER-DEFINED	-	1.30	0.50	1.000	-
USER-DEFINED	-	2.20	0.50	0.900	-
USER-DEFINED	-	2.50	0.50	0.500	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.517
 SUBAREA AREA (ACRES) = 10.00 SUBAREA RUNOFF (CFS) = 7.77
 EFFECTIVE AREA (ACRES) = 186.82 AREA-AVERAGED Fm (INCH/HR) = 0.21
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.41
 TOTAL AREA (ACRES) = 203.9 PEAK FLOW RATE (CFS) = 154.92
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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 FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 17.16
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.122
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	4.70	0.50	0.100	-
USER-DEFINED	-	0.30	0.50	1.000	-
USER-DEFINED	-	4.00	0.50	0.900	-
USER-DEFINED	-	0.60	0.50	0.500	-
USER-DEFINED	-	0.40	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512
 SUBAREA AREA (ACRES) = 10.10 SUBAREA RUNOFF (CFS) = 7.88
 EFFECTIVE AREA (ACRES) = 196.92 AREA-AVERAGED Fm (INCH/HR) = 0.21
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.42
 TOTAL AREA (ACRES) = 214.0 PEAK FLOW RATE (CFS) = 161.73

B-19

 FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 17.16
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.122
 SUBAREA LOSS RATE DATA (AMC II):

B-19

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	1.000	-
USER-DEFINED	-	0.10	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.986
 SUBAREA AREA (ACRES) = 0.70 SUBAREA RUNOFF (CFS) = 0.40
 EFFECTIVE AREA (ACRES) = 197.62 AREA-AVERAGED Fm (INCH/HR) = 0.21
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.42
 TOTAL AREA (ACRES) = 214.7 PEAK FLOW RATE (CFS) = 162.13

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 214.7 TC (MIN.) = 17.16
 EFFECTIVE AREA (ACRES) = 197.62 AREA-AVERAGED Fm (INCH/HR) = 0.21
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.422
 PEAK FLOW RATE (CFS) = 162.13

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	162.13	17.16	1.122	0.50 (0.21)	0.42	197.6	200.00
2	158.89	19.64	1.033	0.50 (0.21)	0.42	214.7	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 1264

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA B ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 10-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3B10EV.DAT
TIME/DATE OF STUDY: 16:25 05/23/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 5.00
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:

- 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 200.00 TO NODE 201.00 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) = 412.00 DOWNSTREAM(FEET) = 402.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.935
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.893

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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.)
COMMERCIAL	B	0.30	0.30	0.100	56	5.94
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	0.10	0.30	0.900	56	9.51
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56	8.04
COMMERCIAL	B	0.30	0.30	0.100	56	5.94
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	0.70	0.30	0.900	56	9.51
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56	8.04

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.580
SUBAREA RUNOFF(CFS) = 7.34
TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 7.34

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 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) = 520.00 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) = 11.06
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.36
HALFSTREET FLOOD WIDTH(FEET) = 11.21
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.20
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.52
STREET FLOW TRAVEL TIME(MIN.) = 2.06 Tc(MIN.) = 8.00
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.446

B-2

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	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.40	0.30	0.600	56
COMMERCIAL	B	0.50	0.30	0.100	56

RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.50 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.50 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.525
 SUBAREA AREA (ACRES) = 3.60 SUBAREA RUNOFF (CFS) = 7.41
 EFFECTIVE AREA (ACRES) = 6.60 AREA-AVERAGED Fm (INCH/HR) = 0.17
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
 TOTAL AREA (ACRES) = 6.6 PEAK FLOW RATE (CFS) = 13.55

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.38 HALFSTREET FLOOD WIDTH (FEET) = 12.30
 FLOW VELOCITY (FEET/SEC.) = 4.38 DEPTH*VELOCITY (FT*FT/SEC.) = 1.68
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 825.00 FEET.

 FLOW PROCESS FROM NODE 202.00 TO NODE 202.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 8.00
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.446
 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	3.40	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA (ACRES) = 3.40 SUBAREA RUNOFF (CFS) = 6.93
 EFFECTIVE AREA (ACRES) = 10.00 AREA-AVERAGED Fm (INCH/HR) = 0.17
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.57
 TOTAL AREA (ACRES) = 10.0 PEAK FLOW RATE (CFS) = 20.48

B-2

 FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 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) = 430.00 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) = 29.32
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH (FEET) = 0.49
 HALFSTREET FLOOD WIDTH (FEET) = 18.24

AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.63
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 2.26
 STREET FLOW TRAVEL TIME (MIN.) = 1.55 Tc (MIN.) = 9.55
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.215

B-3

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					
"11+ DWELLINGS/ACRE"	B	2.70	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.90	0.30	0.900	56
COMMERCIAL	B	0.40	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.60	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.10	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.340
 SUBAREA AREA (ACRES) = 9.30 SUBAREA RUNOFF (CFS) = 17.68
 EFFECTIVE AREA (ACRES) = 19.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 19.3 PEAK FLOW RATE (CFS) = 36.08

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.52 HALFSTREET FLOOD WIDTH (FEET) = 19.88
 FLOW VELOCITY (FEET/SEC.) = 4.84 DEPTH*VELOCITY (FT*FT/SEC.) = 2.51
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 203.00 = 1255.00 FEET.

 FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 9.55
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.215
 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					
".4 DWELLING/ACRE"	B	1.10	0.30	0.900	56
COMMERCIAL	B	2.10	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.20	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	4.40	0.30	0.900	56
COMMERCIAL	B	0.30	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.586
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 16.70
 EFFECTIVE AREA (ACRES) = 28.40 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA (ACRES) = 28.4 PEAK FLOW RATE (CFS) = 52.78

B-4

 FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 9.55 B-4

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.215

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	1.80	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900

SUBAREA AREA(ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 3.15

EFFECTIVE AREA(ACRES) = 30.20 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52

TOTAL AREA(ACRES) = 30.2 PEAK FLOW RATE(CFS) = 55.93

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

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 375.00 DOWNSTREAM(FEET) = 360.00

FLOW LENGTH(FEET) = 1242.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 10.94

ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 55.93

PIPE TRAVEL TIME(MIN.) = 1.89 Tc(MIN.) = 11.44

LONGEST FLOWPATH FROM NODE 200.00 TO NODE 204.00 = 2497.00 FEET.

FLOW PROCESS FROM NODE 204.00 TO NODE 204.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 11.44 B-5

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.001

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.90	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.60	0.30	0.900	56
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
COMMERCIAL	B	0.20	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.609

SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 5.40

EFFECTIVE AREA(ACRES) = 33.50 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53

TOTAL AREA(ACRES) = 33.5 PEAK FLOW RATE(CFS) = 55.93

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 204.00 TO NODE 205.00 IS CODE = 31

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 360.00 DOWNSTREAM(FEET) = 350.00

FLOW LENGTH(FEET) = 937.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 10.39

ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 55.93

PIPE TRAVEL TIME(MIN.) = 1.50 Tc(MIN.) = 12.94

LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 3434.00 FEET.

FLOW PROCESS FROM NODE 205.00 TO NODE 205.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 12.94 B-5.1

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.867

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
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.00	0.30	0.900	56
COMMERCIAL	B	0.50	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.660

SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 4.51

EFFECTIVE AREA(ACRES) = 36.50 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54

TOTAL AREA(ACRES) = 36.5 PEAK FLOW RATE(CFS) = 55.98

FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 31

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 350.00 DOWNSTREAM(FEET) = 345.00

FLOW LENGTH(FEET) = 587.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 9.41

ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 55.98

PIPE TRAVEL TIME(MIN.) = 1.04 Tc(MIN.) = 13.98

LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 4021.00 FEET.

FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 13.98
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.787 **B-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 0.30 0.30 0.100 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56
 COMMERCIAL B 0.40 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.30 0.30 0.400 56
 COMMERCIAL B 0.20 0.30 0.100 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.253
 SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 2.31
 EFFECTIVE AREA(ACRES) = 38.00 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 38.0 PEAK FLOW RATE(CFS) = 55.98
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
 =====
 MAINLINE Tc(MIN.) = 13.98
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.787 **B-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" B 0.10 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
 SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.15
 EFFECTIVE AREA(ACRES) = 38.10 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 38.1 PEAK FLOW RATE(CFS) = 55.98
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 206.00 TO NODE 221.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 345.00 DOWNSTREAM(FEET) = 330.00
 FLOW LENGTH(FEET) = 1217.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.03
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 55.98
 PIPE TRAVEL TIME(MIN.) = 1.84 Tc(MIN.) = 15.82
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 221.00 = 5238.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
 =====
 MAINLINE Tc(MIN.) = 15.82
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.667 **B-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 7.70 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.30 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.40 0.30 0.900 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56
 COMMERCIAL B 3.80 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.40 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.135
 SUBAREA AREA(ACRES) = 12.80 SUBAREA RUNOFF(CFS) = 18.74
 EFFECTIVE AREA(ACRES) = 50.90 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA(ACRES) = 50.9 PEAK FLOW RATE(CFS) = 70.46

 FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
 =====
 MAINLINE Tc(MIN.) = 15.82
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.667 **B-7**
 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" B 0.20 0.30 0.900 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 0.10 0.30 0.500 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.620
 SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 0.67
 EFFECTIVE AREA(ACRES) = 51.40 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA(ACRES) = 51.4 PEAK FLOW RATE(CFS) = 71.13

 FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
 =====
 MAINLINE Tc(MIN.) = 15.82
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.667
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

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LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL    B       6.20     0.30      0.100     56
COMMERCIAL    B       1.30     0.30      0.100     56
RESIDENTIAL
".4 DWELLING/ACRE"  B       0.10     0.30      0.900     56
COMMERCIAL    B       0.50     0.30      0.100     56
RESIDENTIAL
".4 DWELLING/ACRE"  B       0.10     0.30      0.900     56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.120
SUBAREA AREA (ACRES) = 8.20 SUBAREA RUNOFF(CFS) = 12.04
EFFECTIVE AREA (ACRES) = 59.60 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA (ACRES) = 59.6 PEAK FLOW RATE(CFS) = 83.17

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FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
-----

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```

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 15.82
RAINFALL INTENSITY(INCH/HR) = 1.67
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.39
EFFECTIVE STREAM AREA(ACRES) = 59.60
TOTAL STREAM AREA(ACRES) = 59.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 83.17

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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<<
-----

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INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 470.00 DOWNSTREAM(FEET) = 467.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.740
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.190
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.)
PUBLIC PARK B 0.80 0.30 0.850 56 12.58
RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56 12.68
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 1.50 0.30 0.500 56 10.13
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56 9.74
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.615
SUBAREA RUNOFF(CFS) = 4.69
TOTAL AREA (ACRES) = 2.60 PEAK FLOW RATE(CFS) = 4.69

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B-9

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FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
-----

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```

UPSTREAM ELEVATION(FEET) = 467.00 DOWNSTREAM ELEVATION(FEET) = 466.00
STREET LENGTH(FEET) = 193.00 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

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```

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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.96

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STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

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STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.27
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.97
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.86
STREET FLOW TRAVEL TIME(MIN.) = 1.64 Tc(MIN.) = 11.38
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.007

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B-10

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SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56
PUBLIC PARK B 0.50 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 2.20 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 2.00 0.30 0.400 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.501
SUBAREA AREA (ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 8.52
EFFECTIVE AREA (ACRES) = 7.70 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA (ACRES) = 7.7 PEAK FLOW RATE(CFS) = 12.79

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END OF SUBAREA STREET FLOW HYDRAULICS:

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DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.70
FLOW VELOCITY(FEET/SEC.) = 2.14 DEPTH*VELOCITY(FT*FT/SEC.) = 1.02
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 523.00 FEET.

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```

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

MAINLINE Tc(MIN.) = 11.38
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.007

B-10

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 0.70 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.70 SUBAREA RUNOFF(CFS) = 1.19
EFFECTIVE AREA(ACRES) = 8.40 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 8.4 PEAK FLOW RATE(CFS) = 13.97

FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 466.00 DOWNSTREAM ELEVATION(FEET) = 460.00
STREET LENGTH(FEET) = 324.00 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) = 19.62

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.45
HALFSTREET FLOOD WIDTH(FEET) = 16.21
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.86
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.75

STREET FLOW TRAVEL TIME(MIN.) = 1.40 Tc(MIN.) = 12.77

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.880

B-11

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.90 0.30 0.100 56
PUBLIC PARK B 0.40 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 4.00 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 1.70 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457
SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 11.30
EFFECTIVE AREA(ACRES) = 15.60 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 24.31

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.77
FLOW VELOCITY(FEET/SEC.) = 4.03 DEPTH*VELOCITY(FT*FT/SEC.) = 1.94
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 847.00 FEET.

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) = 460.00 DOWNSTREAM(FEET) = 405.00
FLOW LENGTH(FEET) = 508.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.31
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.31
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 13.19
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 214.00 = 1355.00 FEET.

FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.19
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.847

B-12

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 0.10 0.30 0.200 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 0.10 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 3.10 0.30 0.400 56
COMMERCIAL B 1.60 0.30 0.100 56
PUBLIC PARK B 0.60 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.40 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 12.01
EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 35.85

FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.19
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.847
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

B-12

RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 0.10 0.30 0.500 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 4.80 0.30 0.400 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.80 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427
 SUBAREA AREA (ACRES) = 6.00 SUBAREA RUNOFF (CFS) = 9.28
 EFFECTIVE AREA (ACRES) = 29.50 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 29.5 PEAK FLOW RATE (CFS) = 45.13

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) = 405.00 DOWNSTREAM (FEET) = 400.00
 FLOW LENGTH (FEET) = 376.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 21.9 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 10.77
 ESTIMATED PIPE DIAMETER (INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 45.13
 PIPE TRAVEL TIME (MIN.) = 0.58 Tc (MIN.) = 13.77
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 215.00 = 1731.00 FEET.

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.77
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.802
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.00	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.40	0.30	0.500	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.349
 SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 12.68
 EFFECTIVE AREA (ACRES) = 37.80 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 37.8 PEAK FLOW RATE (CFS) = 56.64

B-13

B-13

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.77
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.802
 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"	B	4.10	0.30	0.500	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
 SUBAREA AREA (ACRES) = 4.20 SUBAREA RUNOFF (CFS) = 6.25
 EFFECTIVE AREA (ACRES) = 42.00 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 42.0 PEAK FLOW RATE (CFS) = 62.89

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.77
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.802
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.80	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.50	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.30	0.30	0.400	56
PUBLIC PARK	B	1.20	0.30	0.850	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503
 SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 12.93
 EFFECTIVE AREA (ACRES) = 50.70 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA (ACRES) = 50.7 PEAK FLOW RATE (CFS) = 75.82

B-14

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.77
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.802
 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 3.00 0.30 0.200 56 **B-14**
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.90 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.50 0.30 0.600 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 0.40 0.30 0.500 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 4.80 0.30 0.400 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.80 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.368
 SUBAREA AREA(ACRES) = 11.40 SUBAREA RUNOFF(CFS) = 17.36
 EFFECTIVE AREA(ACRES) = 62.10 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 62.1 PEAK FLOW RATE(CFS) = 93.18

 FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 13.77 **B-14**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.802
 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" B 0.10 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.14
 EFFECTIVE AREA(ACRES) = 62.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 62.2 PEAK FLOW RATE(CFS) = 93.32

 FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 350.00
 FLOW LENGTH(FEET) = 1800.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.85
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 93.32
 PIPE TRAVEL TIME(MIN.) = 1.78 Tc(MIN.) = 15.55
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 216.00 = 3531.00 FEET.

 FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 15.55

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.683 **B-15**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 0.50 0.30 0.100 56
 PUBLIC PARK B 0.50 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.40 0.30 0.900 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 5.70 0.30 0.400 56
 PUBLIC PARK B 0.50 0.30 0.850 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.70 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.508
 SUBAREA AREA(ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 12.82
 EFFECTIVE AREA(ACRES) = 71.50 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 71.5 PEAK FLOW RATE(CFS) = 99.47

 FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 15.55 **B-15**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.683
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 0.40 0.30 0.850 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 2.30 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
 SUBAREA AREA(ACRES) = 2.70 SUBAREA RUNOFF(CFS) = 3.75
 EFFECTIVE AREA(ACRES) = 74.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 74.2 PEAK FLOW RATE(CFS) = 103.22

 FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 15.55 **B-16**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.683
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 1.30 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.40 0.30 0.900 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 0.80 0.30 0.500 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 4.70 0.30 0.400 56
 RESIDENTIAL

"4 DWELLING/ACRE" B 2.00 0.30 0.900 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 0.90 0.30 0.500 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.644
 SUBAREA AREA (ACRES) = 12.10 SUBAREA RUNOFF (CFS) = 16.23
 EFFECTIVE AREA (ACRES) = 86.30 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 86.3 PEAK FLOW RATE (CFS) = 119.44

 FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 15.55
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.683
 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 2.10 0.30 0.400 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 1.40 0.30 0.500 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 1.00 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
 SUBAREA AREA (ACRES) = 4.50 SUBAREA RUNOFF (CFS) = 6.29
 EFFECTIVE AREA (ACRES) = 90.80 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 90.8 PEAK FLOW RATE (CFS) = 125.74

B-16

 FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM (FEET) = 350.00 DOWNSTREAM (FEET) = 340.00
 FLOW LENGTH (FEET) = 886.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.6 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 12.97
 ESTIMATED PIPE DIAMETER (INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 125.74
 PIPE TRAVEL TIME (MIN.) = 1.14 Tc (MIN.) = 16.69
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 217.00 = 4417.00 FEET.

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 16.69
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.618
 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 1.70 0.30 0.200 56
 COMMERCIAL B 4.30 0.30 0.100 56
 PUBLIC PARK B 3.00 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 10.30 0.30 0.200 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 3.70 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298
 SUBAREA AREA (ACRES) = 23.00 SUBAREA RUNOFF (CFS) = 31.64

PUBLIC PARK B 0.30 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.40 0.30 0.200 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.80 0.30 0.200 56
 COMMERCIAL B 0.40 0.30 0.100 56
 PUBLIC PARK B 2.20 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.00 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.460
 SUBAREA AREA (ACRES) = 6.10 SUBAREA RUNOFF (CFS) = 8.12
 EFFECTIVE AREA (ACRES) = 96.90 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 96.9 PEAK FLOW RATE (CFS) = 128.51

B-17

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 16.69
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.618
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 5.20 0.30 0.100 56
 PUBLIC PARK B 0.60 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 8.60 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.191
 SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 20.22
 EFFECTIVE AREA (ACRES) = 111.30 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
 TOTAL AREA (ACRES) = 111.3 PEAK FLOW RATE (CFS) = 148.73

B-17

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 16.69
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.618
 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 1.70 0.30 0.200 56
 COMMERCIAL B 4.30 0.30 0.100 56
 PUBLIC PARK B 3.00 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 10.30 0.30 0.200 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 3.70 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298
 SUBAREA AREA (ACRES) = 23.00 SUBAREA RUNOFF (CFS) = 31.64

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EFFECTIVE AREA(ACRES) = 134.30 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 134.3 PEAK FLOW RATE(CFS) = 180.37

FLOW PROCESS FROM NODE 217.00 TO NODE 221.00 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) = 330.00
 FLOW LENGTH(FEET) = 1266.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 44.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.29
 ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 180.37
 PIPE TRAVEL TIME(MIN.) = 1.72 Tc(MIN.) = 18.41
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 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.) = 18.41
 RAINFALL INTENSITY(INCH/HR) = 1.53
 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.42
 EFFECTIVE STREAM AREA(ACRES) = 134.30
 TOTAL STREAM AREA(ACRES) = 134.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 180.37

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	83.17	15.82	1.667	0.30(0.12)	0.39	59.6	200.00
2	180.37	18.41	1.531	0.30(0.13)	0.42	134.3	210.00

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	253.19	15.82	1.667	0.30(0.12)	0.41	175.0	200.00
2	256.24	18.41	1.531	0.30(0.12)	0.41	193.9	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 256.24 Tc(MIN.) = 18.41
 EFFECTIVE AREA(ACRES) = 193.90 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 193.9
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 330.00 DOWNSTREAM(FEET) = 280.00
 FLOW LENGTH(FEET) = 278.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 43.22
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 256.24
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 18.52
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 222.00 = 5961.00 FEET.

FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.52
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.526
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.80	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
COMMERCIAL	B	1.90	0.30	0.100	56
AGRICULTURAL FAIR COVER					
" ORCHARDS"	B	1.30	0.30	1.000	65
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
RESIDENTIAL					
" 5-7 DWELLINGS/ACRE"	B	2.50	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.517
 SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 12.34
 EFFECTIVE AREA(ACRES) = 203.90 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 203.9 PEAK FLOW RATE(CFS) = 257.24

FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.52
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.526
 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					
" WOODLAND,GRASS"	B	0.10	0.30	1.000	65
COMMERCIAL	B	4.70	0.30	0.100	56
NATURAL FAIR COVER					
" OPEN BRUSH"	B	0.30	0.30	1.000	66
RESIDENTIAL					

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".4 DWELLING/ACRE"      B      4.00    0.30    0.900   56
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   B      0.60    0.30    0.500   56
NATURAL FAIR COVER
"WOODLAND,GRASS"       B      0.40    0.30    1.000   65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512
SUBAREA AREA(ACRES) = 10.10    SUBAREA RUNOFF(CFS) = 12.48
EFFECTIVE AREA(ACRES) = 214.00  AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 214.0    PEAK FLOW RATE(CFS) = 269.72

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FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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MAINLINE Tc(MIN.) = 18.52
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.526
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE               GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
AGRICULTURAL FAIR COVER
"ORCHARDS"              B      0.60    0.30    1.000   65
RESIDENTIAL
".4 DWELLING/ACRE"     B      0.10    0.30    0.900   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.986
SUBAREA AREA(ACRES) = 0.70    SUBAREA RUNOFF(CFS) = 0.78
EFFECTIVE AREA(ACRES) = 214.70  AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 214.7    PEAK FLOW RATE(CFS) = 270.49
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END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 214.7    TC(MIN.) = 18.52
EFFECTIVE AREA(ACRES) = 214.70  AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.421
PEAK FLOW RATE(CFS) = 270.49
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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	270.44	15.93	1.661	0.30(0.13)	0.42	195.8	200.00
2	270.49	18.52	1.526	0.30(0.13)	0.42	214.7	210.00

=====
END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA B ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 25-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3B25EV.DAT
TIME/DATE OF STUDY: 16:24 05/23/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
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:

- 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 200.00 TO NODE 201.00 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) = 412.00 DOWNSTREAM(FEET) = 402.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.935
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.680
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	5.94
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	0.10	0.30	0.900	56	9.51
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56	8.04
COMMERCIAL	B	0.30	0.30	0.100	56	5.94
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	0.70	0.30	0.900	56	9.51
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56	8.04

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.580
SUBAREA RUNOFF(CFS) = 9.46
TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 9.46

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FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 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) = 520.00 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) = 14.28
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.62
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.42
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.71
STREET FLOW TRAVEL TIME(MIN.) = 1.96 Tc(MIN.) = 7.90
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.124

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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	B	0.60	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.40	0.30	0.600	56
COMMERCIAL	B	0.50	0.30	0.100	56

RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.50 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.50 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.525
 SUBAREA AREA (ACRES) = 3.60 SUBAREA RUNOFF (CFS) = 9.61
 EFFECTIVE AREA (ACRES) = 6.60 AREA-AVERAGED Fm (INCH/HR) = 0.17
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
 TOTAL AREA (ACRES) = 6.6 PEAK FLOW RATE (CFS) = 17.58

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.41 HALFSTREET FLOOD WIDTH (FEET) = 13.79
 FLOW VELOCITY (FEET/SEC.) = 4.65 DEPTH*VELOCITY (FT*FT/SEC.) = 1.90
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 825.00 FEET.

 FLOW PROCESS FROM NODE 202.00 TO NODE 202.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 7.90
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 3.124
 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	3.40	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA (ACRES) = 3.40 SUBAREA RUNOFF (CFS) = 9.01
 EFFECTIVE AREA (ACRES) = 10.00 AREA-AVERAGED Fm (INCH/HR) = 0.17
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.57
 TOTAL AREA (ACRES) = 10.0 PEAK FLOW RATE (CFS) = 26.59

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 FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 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) = 430.00 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) = 38.03
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH (FEET) = 0.52
 HALFSTREET FLOOD WIDTH (FEET) = 20.27

AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.92
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 2.58
 STREET FLOW TRAVEL TIME (MIN.) = 1.46 Tc (MIN.) = 9.35
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.836

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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	B	0.60	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.70	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.90	0.30	0.900	56
COMMERCIAL	B	0.40	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.60	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.10	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.340
 SUBAREA AREA (ACRES) = 9.30 SUBAREA RUNOFF (CFS) = 22.88
 EFFECTIVE AREA (ACRES) = 19.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 19.3 PEAK FLOW RATE (CFS) = 46.87

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.56 HALFSTREET FLOOD WIDTH (FEET) = 22.07
 FLOW VELOCITY (FEET/SEC.) = 5.16 DEPTH*VELOCITY (FT*FT/SEC.) = 2.87
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 203.00 = 1255.00 FEET.

 FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 9.35
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.836
 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					
".4 DWELLING/ACRE"	B	1.10	0.30	0.900	56
COMMERCIAL	B	2.10	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.20	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	4.40	0.30	0.900	56
COMMERCIAL	B	0.30	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.586
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 21.78
 EFFECTIVE AREA (ACRES) = 28.40 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA (ACRES) = 28.4 PEAK FLOW RATE (CFS) = 68.66

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 FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 9.35
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.836
 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	1.80	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA(ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 4.16
 EFFECTIVE AREA(ACRES) = 30.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 30.2 PEAK FLOW RATE(CFS) = 72.81

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

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

ELEVATION DATA: UPSTREAM(FEET) = 375.00 DOWNSTREAM(FEET) = 360.00
 FLOW LENGTH(FEET) = 1242.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.64
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 72.81
 PIPE TRAVEL TIME(MIN.) = 1.78 Tc(MIN.) = 11.13
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 204.00 = 2497.00 FEET.

 FLOW PROCESS FROM NODE 204.00 TO NODE 204.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 11.13
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.566
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.90	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.60	0.30	0.900	56
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
COMMERCIAL	B	0.20	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.609
 SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 7.08
 EFFECTIVE AREA(ACRES) = 33.50 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 33.5 PEAK FLOW RATE(CFS) = 72.81
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

B-5

 FLOW PROCESS FROM NODE 204.00 TO NODE 205.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 360.00 DOWNSTREAM(FEET) = 350.00
 FLOW LENGTH(FEET) = 937.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.04
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 72.81
 PIPE TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 12.55
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 3434.00 FEET.

 FLOW PROCESS FROM NODE 205.00 TO NODE 205.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.55
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.396
 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
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.00	0.30	0.900	56
COMMERCIAL	B	0.50	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.660
 SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 5.94
 EFFECTIVE AREA(ACRES) = 36.50 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 36.5 PEAK FLOW RATE(CFS) = 73.38

B-5.1

 FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 350.00 DOWNSTREAM(FEET) = 345.00
 FLOW LENGTH(FEET) = 587.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.24
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 73.38
 PIPE TRAVEL TIME(MIN.) = 0.96 Tc(MIN.) = 13.50
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 4021.00 FEET.

 FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.298

B-6

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
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
COMMERCIAL	B	0.40	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.30	0.30	0.400	56
COMMERCIAL	B	0.20	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.253
SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 3.00
EFFECTIVE AREA(ACRES) = 38.00 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 38.0 PEAK FLOW RATE(CFS) = 73.38
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.50
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.298

B-6

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	0.10	0.30	0.400	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400					
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.20					
EFFECTIVE AREA(ACRES) = 38.10 AREA-AVERAGED Fm(INCH/HR) = 0.16					
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53					
TOTAL AREA(ACRES) = 38.1 PEAK FLOW RATE(CFS) = 73.38					
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE					

FLOW PROCESS FROM NODE 206.00 TO NODE 221.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 345.00 DOWNSTREAM(FEET) = 330.00
FLOW LENGTH(FEET) = 1217.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.75
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 73.38
PIPE TRAVEL TIME(MIN.) = 1.73 Tc(MIN.) = 15.23
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 221.00 = 5238.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.23
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.145

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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	B	7.70	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.30	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
COMMERCIAL	B	3.80	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.40	0.30	0.200	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.135
SUBAREA AREA(ACRES) = 12.80 SUBAREA RUNOFF(CFS) = 24.24
EFFECTIVE AREA(ACRES) = 50.90 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 50.9 PEAK FLOW RATE(CFS) = 92.33

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.23
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.145

B-7

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	0.20	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.620					
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 0.88					
EFFECTIVE AREA(ACRES) = 51.40 AREA-AVERAGED Fm(INCH/HR) = 0.13					
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43					
TOTAL AREA(ACRES) = 51.4 PEAK FLOW RATE(CFS) = 93.21					

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.23
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.145

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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LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL    B       6.20     0.30       0.100      56
COMMERCIAL    B       1.30     0.30       0.100      56
RESIDENTIAL
".4 DWELLING/ACRE"  B       0.10     0.30       0.900      56
COMMERCIAL    B       0.50     0.30       0.100      56
RESIDENTIAL
".4 DWELLING/ACRE"  B       0.10     0.30       0.900      56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.120
SUBAREA AREA (ACRES) = 8.20 SUBAREA RUNOFF(CFS) = 15.56
EFFECTIVE AREA (ACRES) = 59.60 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA (ACRES) = 59.6 PEAK FLOW RATE(CFS) = 108.77

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FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====

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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 15.23
RAINFALL INTENSITY(INCH/HR) = 2.14
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.39
EFFECTIVE STREAM AREA(ACRES) = 59.60
TOTAL STREAM AREA(ACRES) = 59.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 108.77

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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<<
=====

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INITIAL SUBAREA FLOW-LENGTH(FEET) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 470.00 DOWNSTREAM(FEET) = 467.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.740
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.770
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.)
PUBLIC PARK	B	0.80	0.30	0.850	56	12.58
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56	12.68
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	1.50	0.30	0.500	56	10.13
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56	9.74

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.615
SUBAREA RUNOFF(CFS) = 6.05
TOTAL AREA (ACRES) = 2.60 PEAK FLOW RATE(CFS) = 6.05

```

B-9

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FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====

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UPSTREAM ELEVATION(FEET) = 467.00 DOWNSTREAM ELEVATION(FEET) = 466.00
STREET LENGTH(FEET) = 193.00 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

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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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.55

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STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

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STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 16.99
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.08
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.97
STREET FLOW TRAVEL TIME(MIN.) = 1.54 Tc(MIN.) = 11.28
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.546
SUBAREA LOSS RATE DATA(AMC II):

```

B-10

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	2.20	0.30	0.500	56
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	2.00	0.30	0.400	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.501
SUBAREA AREA (ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 11.00
EFFECTIVE AREA (ACRES) = 7.70 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA (ACRES) = 7.7 PEAK FLOW RATE(CFS) = 16.53

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 19.65
FLOW VELOCITY(FEET/SEC.) = 2.27 DEPTH*VELOCITY(FT*FT/SEC.) = 1.17
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 523.00 FEET.

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FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

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MAINLINE Tc(MIN.) = 11.28
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.546

B-10

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 0.70 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.70 SUBAREA RUNOFF(CFS) = 1.53
EFFECTIVE AREA(ACRES) = 8.40 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 8.4 PEAK FLOW RATE(CFS) = 18.05

FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 466.00 DOWNSTREAM ELEVATION(FEET) = 460.00
STREET LENGTH(FEET) = 324.00 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) = 25.36

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.48
HALFSTREET FLOOD WIDTH(FEET) = 18.01
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.10
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.99

STREET FLOW TRAVEL TIME(MIN.) = 1.32 Tc(MIN.) = 12.60

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.390

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SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.90 0.30 0.100 56
PUBLIC PARK B 0.40 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 4.00 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 1.70 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.457
SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 14.60
EFFECTIVE AREA(ACRES) = 15.60 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 31.48

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 19.65
FLOW VELOCITY(FEET/SEC.) = 4.32 DEPTH*VELOCITY(FT*FT/SEC.) = 2.22
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 847.00 FEET.

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) = 460.00 DOWNSTREAM(FEET) = 405.00
FLOW LENGTH(FEET) = 508.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.13
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.48
PIPE TRAVEL TIME(MIN.) = 0.40 Tc(MIN.) = 13.00
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 214.00 = 1355.00 FEET.

FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.348

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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 0.10 0.30 0.200 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 0.10 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 3.10 0.30 0.400 56
COMMERCIAL B 1.60 0.30 0.100 56
PUBLIC PARK B 0.60 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.40 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.524
SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 15.58
EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 46.46

FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.348

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

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RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 0.10 0.30 0.500 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 4.80 0.30 0.400 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.80 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427
 SUBAREA AREA (ACRES) = 6.00 SUBAREA RUNOFF (CFS) = 11.99
 EFFECTIVE AREA (ACRES) = 29.50 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 29.5 PEAK FLOW RATE (CFS) = 58.44

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) = 405.00 DOWNSTREAM (FEET) = 400.00
 FLOW LENGTH (FEET) = 376.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 11.47
 ESTIMATED PIPE DIAMETER (INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 58.44
 PIPE TRAVEL TIME (MIN.) = 0.55 Tc (MIN.) = 13.55
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 215.00 = 1731.00 FEET.

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.55
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.293
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	5.00	0.30	0.200	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	2.40	0.30	0.500	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.349
 SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 16.35
 EFFECTIVE AREA (ACRES) = 37.80 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 37.8 PEAK FLOW RATE (CFS) = 73.34

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FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.55
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.293
 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"	B	4.10	0.30	0.500	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
 SUBAREA AREA (ACRES) = 4.20 SUBAREA RUNOFF (CFS) = 8.10
 EFFECTIVE AREA (ACRES) = 42.00 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 42.0 PEAK FLOW RATE (CFS) = 81.44

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FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.55
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.293
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.80	0.30	0.850	56
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	2.50	0.30	0.200	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	2.30	0.30	0.400	56
PUBLIC PARK	B	1.20	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503
 SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 16.77
 EFFECTIVE AREA (ACRES) = 50.70 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA (ACRES) = 50.7 PEAK FLOW RATE (CFS) = 98.21

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FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.55
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.293
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					

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"11+ DWELLINGS/ACRE"	B	3.00	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.90	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.50	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.40	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.80	0.30	0.400	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.80	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.368
SUBAREA AREA(ACRES) = 11.40 SUBAREA RUNOFF(CFS) = 22.40
EFFECTIVE AREA(ACRES) = 62.10 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 62.1 PEAK FLOW RATE(CFS) = 120.61

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 13.55

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.293

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	0.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.18
EFFECTIVE AREA(ACRES) = 62.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 62.2 PEAK FLOW RATE(CFS) = 120.79

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FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 350.00
FLOW LENGTH(FEET) = 1800.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.87
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 120.79
PIPE TRAVEL TIME(MIN.) = 1.68 Tc(MIN.) = 15.23
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 216.00 = 3531.00 FEET.

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 15.23

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* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.145

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.50	0.30	0.100	56
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.40	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	5.70	0.30	0.400	56
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.70	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.508
SUBAREA AREA(ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 16.68
EFFECTIVE AREA(ACRES) = 71.50 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 71.5 PEAK FLOW RATE(CFS) = 129.16

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 15.23

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.145

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 2.70 SUBAREA RUNOFF(CFS) = 4.87
EFFECTIVE AREA(ACRES) = 74.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 74.2 PEAK FLOW RATE(CFS) = 134.03

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FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 15.23

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.145

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.30	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.40	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.80	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.70	0.30	0.400	56
RESIDENTIAL					

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"4 DWELLING/ACRE" B 2.00 0.30 0.900 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 0.90 0.30 0.500 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.644
 SUBAREA AREA (ACRES) = 12.10 SUBAREA RUNOFF (CFS) = 21.25
 EFFECTIVE AREA (ACRES) = 86.30 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 86.3 PEAK FLOW RATE (CFS) = 155.28

 FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 15.23
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.145 B-16
 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 2.10 0.30 0.400 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 1.40 0.30 0.500 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 1.00 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
 SUBAREA AREA (ACRES) = 4.50 SUBAREA RUNOFF (CFS) = 8.16
 EFFECTIVE AREA (ACRES) = 90.80 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 90.8 PEAK FLOW RATE (CFS) = 163.44

 FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM (FEET) = 350.00 DOWNSTREAM (FEET) = 340.00
 FLOW LENGTH (FEET) = 886.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.1 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 13.66
 ESTIMATED PIPE DIAMETER (INCH) = 51.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 163.44
 PIPE TRAVEL TIME (MIN.) = 1.08 Tc (MIN.) = 16.31
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 217.00 = 4417.00 FEET.

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 16.31
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.062
 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 1.70 0.30 0.200 56
 COMMERCIAL B 4.30 0.30 0.100 56
 PUBLIC PARK B 3.00 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 10.30 0.30 0.200 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 3.70 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298
 SUBAREA AREA (ACRES) = 23.00 SUBAREA RUNOFF (CFS) = 40.83

PUBLIC PARK B 0.30 0.30 0.850 56 B-17
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.40 0.30 0.200 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.80 0.30 0.200 56
 COMMERCIAL B 0.40 0.30 0.100 56
 PUBLIC PARK B 2.20 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.00 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.460
 SUBAREA AREA (ACRES) = 6.10 SUBAREA RUNOFF (CFS) = 10.56
 EFFECTIVE AREA (ACRES) = 96.90 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 96.9 PEAK FLOW RATE (CFS) = 167.25

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 16.31
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.062 B-17
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 5.20 0.30 0.100 56
 PUBLIC PARK B 0.60 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 8.60 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.191
 SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 25.98
 EFFECTIVE AREA (ACRES) = 111.30 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
 TOTAL AREA (ACRES) = 111.3 PEAK FLOW RATE (CFS) = 193.23

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 16.31
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.062 B-18
 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 1.70 0.30 0.200 56
 COMMERCIAL B 4.30 0.30 0.100 56
 PUBLIC PARK B 3.00 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 10.30 0.30 0.200 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 3.70 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298
 SUBAREA AREA (ACRES) = 23.00 SUBAREA RUNOFF (CFS) = 40.83

EFFECTIVE AREA(ACRES) = 134.30 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 134.3 PEAK FLOW RATE(CFS) = 234.06

FLOW PROCESS FROM NODE 217.00 TO NODE 221.00 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) = 330.00
 FLOW LENGTH(FEET) = 1266.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 48.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.13
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 234.06
 PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 17.91
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 17.91
 RAINFALL INTENSITY(INCH/HR) = 1.95
 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.42
 EFFECTIVE STREAM AREA(ACRES) = 134.30
 TOTAL STREAM AREA(ACRES) = 134.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 234.06

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	108.77	15.23	2.145	0.30(0.12)	0.39	59.6	200.00
2	234.06	17.91	1.954	0.30(0.13)	0.42	134.3	210.00

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	328.48	15.23	2.145	0.30(0.12)	0.41	173.8	200.00
2	332.61	17.91	1.954	0.30(0.12)	0.41	193.9	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 332.61 Tc(MIN.) = 17.91
 EFFECTIVE AREA(ACRES) = 193.90 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 193.9
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 330.00 DOWNSTREAM(FEET) = 280.00
 FLOW LENGTH(FEET) = 278.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 46.96
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 332.61
 PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 18.01
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 222.00 = 5961.00 FEET.

FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.01
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.948
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.80	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
COMMERCIAL	B	1.90	0.30	0.100	56
AGRICULTURAL FAIR COVER					
" ORCHARDS"	B	1.30	0.30	1.000	65
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
RESIDENTIAL					
" 5-7 DWELLINGS/ACRE"	B	2.50	0.30	0.500	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.517
 SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 16.13
 EFFECTIVE AREA(ACRES) = 203.90 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 203.9 PEAK FLOW RATE(CFS) = 334.60

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FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.01
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.948
 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					
" WOODLAND,GRASS"	B	0.10	0.30	1.000	65
COMMERCIAL	B	4.70	0.30	0.100	56
NATURAL FAIR COVER					
" OPEN BRUSH"	B	0.30	0.30	1.000	66
RESIDENTIAL					

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".4 DWELLING/ACRE"      B      4.00    0.30    0.900    56
RESIDENTIAL
"5-7 DWELLINGS/ACRE"   B      0.60    0.30    0.500    56
NATURAL FAIR COVER
"WOODLAND,GRASS"       B      0.40    0.30    1.000    65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512
SUBAREA AREA(ACRES) = 10.10    SUBAREA RUNOFF(CFS) = 16.31
EFFECTIVE AREA(ACRES) = 214.00    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30    AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 214.0    PEAK FLOW RATE(CFS) = 350.91

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FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 18.01
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.948
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS
LAND USE                GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
AGRICULTURAL FAIR COVER
"ORCHARDS"              B      0.60    0.30    1.000    65
RESIDENTIAL
".4 DWELLING/ACRE"      B      0.10    0.30    0.900    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.986
SUBAREA AREA(ACRES) = 0.70    SUBAREA RUNOFF(CFS) = 1.04
EFFECTIVE AREA(ACRES) = 214.70    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30    AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 214.7    PEAK FLOW RATE(CFS) = 351.95
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END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 214.7    TC(MIN.) = 18.01
EFFECTIVE AREA(ACRES) = 214.70    AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30    AREA-AVERAGED Ap = 0.421
PEAK FLOW RATE(CFS) = 351.95

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** PEAK FLOW RATE TABLE **

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STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	351.95	15.33	2.137	0.30 (0.13)	0.42	194.6	200.00
2	351.95	18.01	1.948	0.30 (0.13)	0.42	214.7	210.00

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END OF RATIONAL METHOD ANALYSIS

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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:

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA B ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 50-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3B50EV.DAT
TIME/DATE OF STUDY: 16:23 05/23/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 15.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 4.440
- 2) 10.00; 3.010
- 3) 15.00; 2.390
- 4) 20.00; 2.030
- 5) 25.00; 1.790
- 6) 30.00; 1.600
- 7) 40.00; 1.370
- 8) 50.00; 1.200
- 9) 60.00; 1.060
- 10) 90.00; 0.860
- 11) 120.00; 0.730
- 12) 180.00; 0.590
- 13) 360.00; 0.410
- 14) 1200.00; 0.170

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) (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

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 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) = 412.00 DOWNSTREAM(FEET) = 402.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.935
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 4.172

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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.)
COMMERCIAL	B	0.30	0.30	0.100	56	5.94
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56	9.51
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56	8.04
COMMERCIAL	B	0.30	0.30	0.100	56	5.94
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56	9.51
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56	8.04

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.580
SUBAREA RUNOFF(CFS) = 10.80
TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 10.80

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 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) = 520.00 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) = 16.44
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.40
 HALFSTREET FLOOD WIDTH(FEET) = 13.40
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.57
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.84
 STREET FLOW TRAVEL TIME(MIN.) = 1.89 Tc(MIN.) = 7.83 **B-2**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.631

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	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.40	0.30	0.600	56
COMMERCIAL	B	0.50	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.50	0.30	0.200	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.50	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.525
 SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 11.25
 EFFECTIVE AREA(ACRES) = 6.60 AREA-AVERAGED Fm(INCH/HR) = 0.17
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
 TOTAL AREA(ACRES) = 6.6 PEAK FLOW RATE(CFS) = 20.59

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 14.73
 FLOW VELOCITY(FEET/SEC.) = 4.83 DEPTH*VELOCITY(FT*FT/SEC.) = 2.06
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 825.00 FEET.

 FLOW PROCESS FROM NODE 202.00 TO NODE 202.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 7.83
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.631 **B-2**

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	3.40	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 3.40 SUBAREA RUNOFF(CFS) = 10.56
 EFFECTIVE AREA(ACRES) = 10.00 AREA-AVERAGED Fm(INCH/HR) = 0.17
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.57
 TOTAL AREA(ACRES) = 10.0 PEAK FLOW RATE(CFS) = 31.14

 FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 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) = 430.00 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) = 44.24
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.55
 HALFSTREET FLOOD WIDTH(FEET) = 21.52
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.11
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.79
 STREET FLOW TRAVEL TIME(MIN.) = 1.40 Tc(MIN.) = 9.23 **B-3**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.229

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					
"11+ DWELLINGS/ACRE"	B	2.70	0.30	0.200	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.90	0.30	0.900	56
COMMERCIAL	B	0.40	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.60	0.30	0.200	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.10	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.340
 SUBAREA AREA(ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 26.18
 EFFECTIVE AREA(ACRES) = 19.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 19.3 PEAK FLOW RATE(CFS) = 53.71

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.58 HALFSTREET FLOOD WIDTH(FEET) = 23.24
 FLOW VELOCITY(FEET/SEC.) = 5.35 DEPTH*VELOCITY(FT*FT/SEC.) = 3.09
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 203.00 = 1255.00 FEET.

 FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 9.23
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.229 **B-4**

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					
" .4 DWELLING/ACRE"	B	1.10	0.30	0.900	56
COMMERCIAL	B	2.10	0.30	0.100	56

RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.20 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 4.40 0.30 0.900 56
 COMMERCIAL B 0.30 0.30 0.100 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.586
 SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 25.01
 EFFECTIVE AREA(ACRES) = 28.40 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 28.4 PEAK FLOW RATE(CFS) = 78.72

 FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 9.23
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.229 **B-4**
 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	1.80	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA(ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 4.79
 EFFECTIVE AREA(ACRES) = 30.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 30.2 PEAK FLOW RATE(CFS) = 83.51

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

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

ELEVATION DATA: UPSTREAM(FEET) = 375.00 DOWNSTREAM(FEET) = 360.00
 FLOW LENGTH(FEET) = 1242.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.82
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 83.51
 PIPE TRAVEL TIME(MIN.) = 1.75 Tc(MIN.) = 10.98
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 204.00 = 2497.00 FEET.

 FLOW PROCESS FROM NODE 204.00 TO NODE 204.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.98
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.888 **B-5**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.90	0.30	0.100	56
RESIDENTIAL					

".4 DWELLING/ACRE" B 1.60 0.30 0.900 56
 COMMERCIAL B 0.10 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
 COMMERCIAL B 0.20 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.609
 SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 8.03
 EFFECTIVE AREA(ACRES) = 33.50 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 33.5 PEAK FLOW RATE(CFS) = 83.51
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 204.00 TO NODE 205.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 360.00 DOWNSTREAM(FEET) = 350.00
 FLOW LENGTH(FEET) = 937.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.50
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 83.51
 PIPE TRAVEL TIME(MIN.) = 1.36 Tc(MIN.) = 12.34
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 3434.00 FEET.

 FLOW PROCESS FROM NODE 205.00 TO NODE 205.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.34
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.720 **B-5.1**
 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
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.00	0.30	0.900	56
COMMERCIAL	B	0.50	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.10	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.660
 SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 6.81
 EFFECTIVE AREA(ACRES) = 36.50 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 36.5 PEAK FLOW RATE(CFS) = 84.00

 FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 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) = 350.00 DOWNSTREAM(FEET) = 345.00
FLOW LENGTH(FEET) = 587.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.42
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 84.00
PIPE TRAVEL TIME(MIN.) = 0.94 Tc(MIN.) = 13.28
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 4021.00 FEET.

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*****
FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 13.28
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.603
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
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B      0.20    0.30    0.400  56
COMMERCIAL           B      0.40    0.30    0.100  56
RESIDENTIAL
".4 DWELLING/ACRE"   B      0.10    0.30    0.900  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B      0.30    0.30    0.400  56
COMMERCIAL           B      0.20    0.30    0.100  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.253
SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 3.41
EFFECTIVE AREA(ACRES) = 38.00 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 38.0 PEAK FLOW RATE(CFS) = 84.00
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 13.28
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.603
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      0.10    0.30    0.400  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.22
EFFECTIVE AREA(ACRES) = 38.10 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 38.1 PEAK FLOW RATE(CFS) = 84.00
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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B-6

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FLOW PROCESS FROM NODE 206.00 TO NODE 221.00 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) = 330.00
FLOW LENGTH(FEET) = 1217.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.94
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 84.00
PIPE TRAVEL TIME(MIN.) = 1.70 Tc(MIN.) = 14.98
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 221.00 = 5238.00 FEET.

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*****
FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 14.98
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.393
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp      Ap    SCS
  LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           B      7.70    0.30    0.100  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      0.30    0.30    0.200  56
RESIDENTIAL
".4 DWELLING/ACRE"   B      0.40    0.30    0.900  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B      0.20    0.30    0.400  56
COMMERCIAL           B      3.80    0.30    0.100  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      0.40    0.30    0.200  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.135
SUBAREA AREA(ACRES) = 12.80 SUBAREA RUNOFF(CFS) = 27.09
EFFECTIVE AREA(ACRES) = 50.90 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 50.9 PEAK FLOW RATE(CFS) = 103.68

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*****
FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 14.98
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.393
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"   B      0.20    0.30    0.900  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B      0.10    0.30    0.500  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B      0.20    0.30    0.400  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

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B-7

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.620
 SUBAREA AREA (ACRES) = 0.50 SUBAREA RUNOFF (CFS) = 0.99
 EFFECTIVE AREA (ACRES) = 51.40 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA (ACRES) = 51.4 PEAK FLOW RATE (CFS) = 104.68

 FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 14.98
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.393
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 6.20 0.30 0.100 56
 COMMERCIAL B 1.30 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 COMMERCIAL B 0.50 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.120
 SUBAREA AREA (ACRES) = 8.20 SUBAREA RUNOFF (CFS) = 17.39
 EFFECTIVE AREA (ACRES) = 59.60 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA (ACRES) = 59.6 PEAK FLOW RATE (CFS) = 122.07

B-8

 FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION (MIN.) = 14.98
 RAINFALL INTENSITY (INCH/HR) = 2.39
 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.39
 EFFECTIVE STREAM AREA (ACRES) = 59.60
 TOTAL STREAM AREA (ACRES) = 59.60
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 122.07

 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) = 330.00
 ELEVATION DATA: UPSTREAM (FEET) = 470.00 DOWNSTREAM (FEET) = 467.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.740
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 3.084

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.)
 PUBLIC PARK B 0.80 0.30 0.850 56 12.58
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56 12.68
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 1.50 0.30 0.500 56 10.13
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56 9.74
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.615
 SUBAREA RUNOFF (CFS) = 6.79
 TOTAL AREA (ACRES) = 2.60 PEAK FLOW RATE (CFS) = 6.79

B-9

 FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 62

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

UPSTREAM ELEVATION (FEET) = 467.00 DOWNSTREAM ELEVATION (FEET) = 466.00
 STREET LENGTH (FEET) = 193.00 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) = 13.00
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH (FEET) = 0.48
 HALFSTREET FLOOD WIDTH (FEET) = 17.85
 AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.14
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.03
 STREET FLOW TRAVEL TIME (MIN.) = 1.50 Tc (MIN.) = 11.24
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.856

B-10

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 0.20 0.30 0.400 56
 PUBLIC PARK B 0.50 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 2.20 0.30 0.500 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 2.00 0.30 0.400 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.501

SUBAREA AREA (ACRES) = 5.10 SUBAREA RUNOFF (CFS) = 12.42
EFFECTIVE AREA (ACRES) = 7.70 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA (ACRES) = 7.7 PEAK FLOW RATE (CFS) = 18.67

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.53 HALFSTREET FLOOD WIDTH (FEET) = 20.59
FLOW VELOCITY (FEET/SEC.) = 2.35 DEPTH*VELOCITY (FT*FT/SEC.) = 1.24
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 523.00 FEET.

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 11.24
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.856

B-10

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 0.70 0.30 0.400 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA (ACRES) = 0.70 SUBAREA RUNOFF (CFS) = 1.72
EFFECTIVE AREA (ACRES) = 8.40 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA (ACRES) = 8.4 PEAK FLOW RATE (CFS) = 20.39

FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 62

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

UPSTREAM ELEVATION (FEET) = 466.00 DOWNSTREAM ELEVATION (FEET) = 460.00
STREET LENGTH (FEET) = 324.00 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) = 28.69
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.50
HALFSTREET FLOOD WIDTH (FEET) = 18.95
AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.22
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 2.11
STREET FLOW TRAVEL TIME (MIN.) = 1.28 Tc (MIN.) = 12.52

* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.697
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN B-11
COMMERCIAL B 0.90 0.30 0.100 56
PUBLIC PARK B 0.40 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 4.00 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 1.70 0.30 0.400 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.457
SUBAREA AREA (ACRES) = 7.20 SUBAREA RUNOFF (CFS) = 16.59
EFFECTIVE AREA (ACRES) = 15.60 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 15.6 PEAK FLOW RATE (CFS) = 35.78

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.53 HALFSTREET FLOOD WIDTH (FEET) = 20.74
FLOW VELOCITY (FEET/SEC.) = 4.43 DEPTH*VELOCITY (FT*FT/SEC.) = 2.36
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 847.00 FEET.

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) = 460.00 DOWNSTREAM (FEET) = 405.00
FLOW LENGTH (FEET) = 508.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 22.40
ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 35.78
PIPE TRAVEL TIME (MIN.) = 0.38 Tc (MIN.) = 12.90
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 214.00 = 1355.00 FEET.

FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 12.90
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.650

B-12

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 0.10 0.30 0.200 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 0.10 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 3.10 0.30 0.400 56
COMMERCIAL B 1.60 0.30 0.100 56
PUBLIC PARK B 0.60 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.40 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.524

SUBAREA AREA (ACRES) = 7.90 SUBAREA RUNOFF (CFS) = 17.72
 EFFECTIVE AREA (ACRES) = 23.50 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA (ACRES) = 23.5 PEAK FLOW RATE (CFS) = 52.85

FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 12.90
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.650
 SUBAREA LOSS RATE DATA (AMC II):

B-12

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.80	0.30	0.400	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.80	0.30	0.400	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.427					
SUBAREA AREA (ACRES) = 6.00 SUBAREA RUNOFF (CFS) = 13.62					
EFFECTIVE AREA (ACRES) = 29.50 AREA-AVERAGED Fm (INCH/HR) = 0.15					
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49					
TOTAL AREA (ACRES) = 29.5 PEAK FLOW RATE (CFS) = 66.47					

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) = 405.00 DOWNSTREAM (FEET) = 400.00
 FLOW LENGTH (FEET) = 376.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.0 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 11.70
 ESTIMATED PIPE DIAMETER (INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 66.47
 PIPE TRAVEL TIME (MIN.) = 0.54 Tc (MIN.) = 13.44
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 215.00 = 1731.00 FEET.

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.44
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.584
 SUBAREA LOSS RATE DATA (AMC II):

B-13

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
RESIDENTIAL					

"11+ DWELLINGS/ACRE"	B	5.00	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.40	0.30	0.500	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.349					
SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 18.52					
EFFECTIVE AREA (ACRES) = 37.80 AREA-AVERAGED Fm (INCH/HR) = 0.14					
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46					
TOTAL AREA (ACRES) = 37.8 PEAK FLOW RATE (CFS) = 83.22					

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.44
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.584
 SUBAREA LOSS RATE DATA (AMC II):

B-13

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	4.10	0.30	0.500	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500					
SUBAREA AREA (ACRES) = 4.20 SUBAREA RUNOFF (CFS) = 9.20					
EFFECTIVE AREA (ACRES) = 42.00 AREA-AVERAGED Fm (INCH/HR) = 0.14					
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46					
TOTAL AREA (ACRES) = 42.0 PEAK FLOW RATE (CFS) = 92.42					

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 13.44
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.584
 SUBAREA LOSS RATE DATA (AMC II):

B-14

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.80	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.50	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.30	0.30	0.400	56
PUBLIC PARK	B	1.20	0.30	0.850	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503					
SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 19.05					

EFFECTIVE AREA(ACRES) = 50.70 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 50.7 PEAK FLOW RATE(CFS) = 111.47

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.44
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.584 **B-14**

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 3.00 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.90 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.50 0.30 0.600 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 0.40 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 4.80 0.30 0.400 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 1.80 0.30 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.368
SUBAREA AREA(ACRES) = 11.40 SUBAREA RUNOFF(CFS) = 25.38
EFFECTIVE AREA(ACRES) = 62.10 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 62.1 PEAK FLOW RATE(CFS) = 136.85

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.44
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.584 **B-14**

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" B 0.10 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.21
EFFECTIVE AREA(ACRES) = 62.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 62.2 PEAK FLOW RATE(CFS) = 137.05

FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 350.00
FLOW LENGTH(FEET) = 1800.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.60
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 137.05
PIPE TRAVEL TIME(MIN.) = 1.61 Tc(MIN.) = 15.05
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 216.00 = 3531.00 FEET.

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.05
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.386 **B-15**

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.50 0.30 0.100 56
PUBLIC PARK B 0.50 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.40 0.30 0.900 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 5.70 0.30 0.400 56
PUBLIC PARK B 0.50 0.30 0.850 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.70 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.508
SUBAREA AREA(ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 18.70
EFFECTIVE AREA(ACRES) = 71.50 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 71.5 PEAK FLOW RATE(CFS) = 144.70

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.05
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.386 **B-15**

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 0.40 0.30 0.850 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 2.30 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 2.70 SUBAREA RUNOFF(CFS) = 5.46
EFFECTIVE AREA(ACRES) = 74.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 74.2 PEAK FLOW RATE(CFS) = 150.16

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 15.05 **B-16**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.386
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.30	0.30	0.850	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	2.40	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.80	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.70	0.30	0.400	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	2.00	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.90	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.644
 SUBAREA AREA(ACRES) = 12.10 SUBAREA RUNOFF(CFS) = 23.88
 EFFECTIVE AREA(ACRES) = 86.30 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 86.3 PEAK FLOW RATE(CFS) = 174.05

 FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 15.05 **B-16**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.386
 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	2.10	0.30	0.400	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	1.40	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.00	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
 SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 9.14
 EFFECTIVE AREA(ACRES) = 90.80 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 90.8 PEAK FLOW RATE(CFS) = 183.19

 FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 350.00 DOWNSTREAM(FEET) = 340.00
 FLOW LENGTH(FEET) = 886.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.15

ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 183.19
 PIPE TRAVEL TIME(MIN.) = 1.04 Tc(MIN.) = 16.09
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 217.00 = 4417.00 FEET.

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 16.09 **B-17**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.311
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.40	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.80	0.30	0.200	56
COMMERCIAL	B	0.40	0.30	0.100	56
PUBLIC PARK	B	2.20	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.00	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.460
 SUBAREA AREA(ACRES) = 6.10 SUBAREA RUNOFF(CFS) = 11.93
 EFFECTIVE AREA(ACRES) = 96.90 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 96.9 PEAK FLOW RATE(CFS) = 188.98

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 16.09 **B-17**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.311
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	5.20	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	8.60	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.191
 SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 29.21
 EFFECTIVE AREA(ACRES) = 111.30 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
 TOTAL AREA(ACRES) = 111.3 PEAK FLOW RATE(CFS) = 218.19

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 16.09

* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.311

B-18

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	1.70	0.30	0.200	56
COMMERCIAL	B	4.30	0.30	0.100	56
PUBLIC PARK	B	3.00	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	10.30	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.70	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298
SUBAREA AREA (ACRES) = 23.00 SUBAREA RUNOFF (CFS) = 45.99
EFFECTIVE AREA (ACRES) = 134.30 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
TOTAL AREA (ACRES) = 134.3 PEAK FLOW RATE (CFS) = 264.18

FLOW PROCESS FROM NODE 217.00 TO NODE 221.00 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) = 330.00
FLOW LENGTH (FEET) = 1266.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 50.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 13.54
ESTIMATED PIPE DIAMETER (INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 264.18
PIPE TRAVEL TIME (MIN.) = 1.56 Tc (MIN.) = 17.65
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 17.65
RAINFALL INTENSITY (INCH/HR) = 2.20
AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA (ACRES) = 134.30
TOTAL STREAM AREA (ACRES) = 134.30
PEAK FLOW RATE (CFS) AT CONFLUENCE = 264.18

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	122.07	14.98	2.393	0.30 (0.12)	0.39	59.6	200.00
2	264.18	17.65	2.199	0.30 (0.13)	0.42	134.3	210.00

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 (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	367.16	14.98	2.393	0.30 (0.12)	0.41	173.6	200.00
2	375.86	17.65	2.199	0.30 (0.12)	0.41	193.9	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 375.86 Tc (MIN.) = 17.65
EFFECTIVE AREA (ACRES) = 193.90 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA (ACRES) = 193.9
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 330.00 DOWNSTREAM (FEET) = 280.00
FLOW LENGTH (FEET) = 278.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 47.78
ESTIMATED PIPE DIAMETER (INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 375.86
PIPE TRAVEL TIME (MIN.) = 0.10 Tc (MIN.) = 17.75
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 222.00 = 5961.00 FEET.

FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 17.75

* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.192

B-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	1.80	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
COMMERCIAL	B	1.90	0.30	0.100	56
AGRICULTURAL FAIR COVER					
"ORCHARDS"	B	1.30	0.30	1.000	65
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.50	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.517
SUBAREA AREA (ACRES) = 10.00 SUBAREA RUNOFF (CFS) = 18.33
EFFECTIVE AREA (ACRES) = 203.90 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA (ACRES) = 203.9 PEAK FLOW RATE (CFS) = 379.42

FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.75 B-19
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.192
 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					
"WOODLAND,GRASS"	B	0.10	0.30	1.000	65
COMMERCIAL	B	4.70	0.30	0.100	56
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	4.00	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.60	0.30	0.500	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.40	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512
 SUBAREA AREA (ACRES) = 10.10 SUBAREA RUNOFF (CFS) = 18.53
 EFFECTIVE AREA (ACRES) = 214.00 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA (ACRES) = 214.0 PEAK FLOW RATE (CFS) = 397.95

FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.75 B-19
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.192
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
AGRICULTURAL FAIR COVER					
"ORCHARDS"	B	0.60	0.30	1.000	65
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.986
 SUBAREA AREA (ACRES) = 0.70 SUBAREA RUNOFF (CFS) = 1.19
 EFFECTIVE AREA (ACRES) = 214.70 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA (ACRES) = 214.7 PEAK FLOW RATE (CFS) = 399.14

END OF STUDY SUMMARY:
 TOTAL AREA (ACRES) = 214.7 TC(MIN.) = 17.75
 EFFECTIVE AREA (ACRES) = 214.70 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.421
 PEAK FLOW RATE (CFS) = 399.14

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	394.98	15.08	2.384	0.30 (0.13)	0.42	194.4	200.00

2 399.14 17.75 2.192 0.30 (0.13) 0.42 214.7 210.00

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

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA B ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 100-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3B00EV.DAT
TIME/DATE OF STUDY: 12:55 05/23/2018

=====

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:

- 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 200.00 TO NODE 201.00 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) = 412.00 DOWNSTREAM(FEET) = 402.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.935
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.377
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	5.94
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	0.10	0.30	0.900	56	9.51
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56	8.04
COMMERCIAL	B	0.30	0.30	0.100	56	5.94
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	0.70	0.30	0.900	56	9.51
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56	8.04

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.580
SUBAREA RUNOFF(CFS) = 11.35
TOTAL AREA(ACRES) = 3.00 PEAK FLOW RATE(CFS) = 11.35

B-1

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 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) = 520.00 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) = 17.18
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 13.63
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.63
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.88
STREET FLOW TRAVEL TIME(MIN.) = 1.87 Tc(MIN.) = 7.81
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.749

B-2

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	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.40	0.30	0.600	56
COMMERCIAL	B	0.50	0.30	0.100	56

RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.50 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.50 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.525
 SUBAREA AREA (ACRES) = 3.60 SUBAREA RUNOFF (CFS) = 11.64
 EFFECTIVE AREA (ACRES) = 6.60 AREA-AVERAGED Fm (INCH/HR) = 0.17
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
 TOTAL AREA (ACRES) = 6.6 PEAK FLOW RATE (CFS) = 21.29

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.43 HALFSTREET FLOOD WIDTH (FEET) = 14.96
 FLOW VELOCITY (FEET/SEC.) = 4.85 DEPTH*VELOCITY (FT*FT/SEC.) = 2.09
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 825.00 FEET.

 FLOW PROCESS FROM NODE 202.00 TO NODE 202.00 IS CODE = 81

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

 MAINLINE Tc (MIN.) = 7.81
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.749
 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" B 3.40 0.30 0.600 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA (ACRES) = 3.40 SUBAREA RUNOFF (CFS) = 10.92
 EFFECTIVE AREA (ACRES) = 10.00 AREA-AVERAGED Fm (INCH/HR) = 0.17
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.57
 TOTAL AREA (ACRES) = 10.0 PEAK FLOW RATE (CFS) = 32.21

B-2

 FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 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) = 430.00 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) = 46.09
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH (FEET) = 0.55
 HALFSTREET FLOOD WIDTH (FEET) = 21.91

AVERAGE FLOW VELOCITY (FEET/SEC.) = 5.14
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 2.85
 STREET FLOW TRAVEL TIME (MIN.) = 1.39 Tc (MIN.) = 9.20
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.416

B-3

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
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 2.70 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.90 0.30 0.900 56
 COMMERCIAL B 0.40 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 3.60 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.10 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.340
 SUBAREA AREA (ACRES) = 9.30 SUBAREA RUNOFF (CFS) = 27.74
 EFFECTIVE AREA (ACRES) = 19.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 19.3 PEAK FLOW RATE (CFS) = 56.95

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.59 HALFSTREET FLOOD WIDTH (FEET) = 23.79
 FLOW VELOCITY (FEET/SEC.) = 5.43 DEPTH*VELOCITY (FT*FT/SEC.) = 3.19
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 203.00 = 1255.00 FEET.

 FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81

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

 MAINLINE Tc (MIN.) = 9.20
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.416
 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
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.10 0.30 0.900 56
 COMMERCIAL B 2.10 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.20 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 4.40 0.30 0.900 56
 COMMERCIAL B 0.30 0.30 0.100 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.586
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 26.54
 EFFECTIVE AREA (ACRES) = 28.40 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA (ACRES) = 28.4 PEAK FLOW RATE (CFS) = 83.49

B-4

 FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 9.20
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.416 **B-4**
 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" B 1.80 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA(ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 5.10
 EFFECTIVE AREA(ACRES) = 30.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 30.2 PEAK FLOW RATE(CFS) = 88.59

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

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 ELEVATION DATA: UPSTREAM(FEET) = 375.00 DOWNSTREAM(FEET) = 360.00
 FLOW LENGTH(FEET) = 1242.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.23
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 88.59
 PIPE TRAVEL TIME(MIN.) = 1.69 Tc(MIN.) = 10.89
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 204.00 = 2497.00 FEET.

 FLOW PROCESS FROM NODE 204.00 TO NODE 204.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.89
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.104 **B-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 0.90 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.60 0.30 0.900 56
 COMMERCIAL B 0.10 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
 COMMERCIAL B 0.20 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.609
 SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 8.68
 EFFECTIVE AREA(ACRES) = 33.50 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 33.5 PEAK FLOW RATE(CFS) = 88.80

FLOW PROCESS FROM NODE 204.00 TO NODE 205.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 360.00 DOWNSTREAM(FEET) = 350.00
 FLOW LENGTH(FEET) = 937.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.60
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 88.80
 PIPE TRAVEL TIME(MIN.) = 1.35 Tc(MIN.) = 12.24
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 3434.00 FEET.

 FLOW PROCESS FROM NODE 205.00 TO NODE 205.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.24
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.906 **B-5.1**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 0.40 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.00 0.30 0.900 56
 COMMERCIAL B 0.50 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.10 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.660
 SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 7.31
 EFFECTIVE AREA(ACRES) = 36.50 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 36.5 PEAK FLOW RATE(CFS) = 90.13

 FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 350.00 DOWNSTREAM(FEET) = 345.00
 FLOW LENGTH(FEET) = 587.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.76
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 90.13
 PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 13.15
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 206.00 = 4021.00 FEET.

 FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.15

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.791 **B-6**

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
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
COMMERCIAL	B	0.40	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.30	0.30	0.400	56
COMMERCIAL	B	0.20	0.30	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.253
SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 3.66
EFFECTIVE AREA(ACRES) = 38.00 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 38.0 PEAK FLOW RATE(CFS) = 90.13
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 206.00 TO NODE 206.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.15
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.791 **B-6**

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	0.10	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.24
EFFECTIVE AREA(ACRES) = 38.10 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 38.1 PEAK FLOW RATE(CFS) = 90.25

FLOW PROCESS FROM NODE 206.00 TO NODE 221.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 345.00 DOWNSTREAM(FEET) = 330.00
FLOW LENGTH(FEET) = 1217.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.37
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 90.25
PIPE TRAVEL TIME(MIN.) = 1.64 Tc(MIN.) = 14.79
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 221.00 = 5238.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.79
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.611 **B-7**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	7.70	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.30	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
COMMERCIAL	B	3.80	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.40	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.135
SUBAREA AREA(ACRES) = 12.80 SUBAREA RUNOFF(CFS) = 29.61
EFFECTIVE AREA(ACRES) = 50.90 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 50.9 PEAK FLOW RATE(CFS) = 113.70

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.79
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.611 **B-7**

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	0.20	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.620
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.09
EFFECTIVE AREA(ACRES) = 51.40 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 51.4 PEAK FLOW RATE(CFS) = 114.79

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.79
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.611 **B-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	6.20	0.30	0.100	56

```

COMMERCIAL          B      1.30    0.30    0.100  56
RESIDENTIAL
".4 DWELLING/ACRE"  B      0.10    0.30    0.900  56
COMMERCIAL          B      0.50    0.30    0.100  56
RESIDENTIAL
".4 DWELLING/ACRE"  B      0.10    0.30    0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.120
SUBAREA AREA (ACRES) = 8.20    SUBAREA RUNOFF (CFS) = 19.01
EFFECTIVE AREA (ACRES) = 59.60    AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30    AREA-AVERAGED Ap = 0.39
TOTAL AREA (ACRES) = 59.6    PEAK FLOW RATE (CFS) = 133.80

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FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 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.) = 14.79
RAINFALL INTENSITY (INCH/HR) = 2.61
AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.39
EFFECTIVE STREAM AREA (ACRES) = 59.60
TOTAL STREAM AREA (ACRES) = 59.60
PEAK FLOW RATE (CFS) AT CONFLUENCE = 133.80

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FLOW PROCESS FROM NODE 210.00 TO NODE 211.00 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) = 470.00    DOWNSTREAM (FEET) = 467.00

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Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)] ** 0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.740
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.307
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.)
PUBLIC PARK          B      0.80    0.30    0.850  56    12.58
RESIDENTIAL
".4 DWELLING/ACRE"  B      0.10    0.30    0.900  56    12.68
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B      1.50    0.30    0.500  56    10.13
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B      0.20    0.30    0.400  56    9.74
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.615
SUBAREA RUNOFF (CFS) = 7.31
TOTAL AREA (ACRES) = 2.60    PEAK FLOW RATE (CFS) = 7.31

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*****
FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 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) = 467.00    DOWNSTREAM ELEVATION (FEET) = 466.00
STREET LENGTH (FEET) = 193.00    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

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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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 13.97

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STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.49
HALFSTREET FLOOD WIDTH (FEET) = 18.32
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.19
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.07
STREET FLOW TRAVEL TIME (MIN.) = 1.47    Tc (MIN.) = 11.21
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.055

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B-10

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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      0.20    0.30    0.400  56
PUBLIC PARK          B      0.50    0.30    0.850  56
RESIDENTIAL
".4 DWELLING/ACRE"  B      0.10    0.30    0.900  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B      2.20    0.30    0.500  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B      2.00    0.30    0.400  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B      0.10    0.30    0.600  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.501
SUBAREA AREA (ACRES) = 5.10    SUBAREA RUNOFF (CFS) = 13.33
EFFECTIVE AREA (ACRES) = 7.70    AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30    AREA-AVERAGED Ap = 0.54
TOTAL AREA (ACRES) = 7.7    PEAK FLOW RATE (CFS) = 20.05

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.54    HALFSTREET FLOOD WIDTH (FEET) = 21.21
FLOW VELOCITY (FEET/SEC.) = 2.38    DEPTH*VELOCITY (FT*FT/SEC.) = 1.29
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 523.00 FEET.

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FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 IS CODE = 81

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

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MAINLINE Tc (MIN.) = 11.21
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.055

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B-10

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	0.70	0.30	0.400	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
 SUBAREA AREA(ACRES) = 0.70 SUBAREA RUNOFF(CFS) = 1.85
 EFFECTIVE AREA(ACRES) = 8.40 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 8.4 PEAK FLOW RATE(CFS) = 21.89

 FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 466.00 DOWNSTREAM ELEVATION(FEET) = 460.00
 STREET LENGTH(FEET) = 324.00 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) = 30.77

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.51
 HALFSTREET FLOOD WIDTH(FEET) = 19.49
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.29
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.19

STREET FLOW TRAVEL TIME(MIN.) = 1.26 Tc(MIN.) = 12.47 B-11
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.876

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.90	0.30	0.100	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	4.00	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.70	0.30	0.400	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.457
 SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 17.75
 EFFECTIVE AREA(ACRES) = 15.60 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 15.6 PEAK FLOW RATE(CFS) = 38.29

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 21.29
 FLOW VELOCITY(FEET/SEC.) = 4.51 DEPTH*VELOCITY(FT*FT/SEC.) = 2.45
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 213.00 = 847.00 FEET.

 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) = 460.00 DOWNSTREAM(FEET) = 405.00
 FLOW LENGTH(FEET) = 508.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.71
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 38.29
 PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 12.84
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 214.00 = 1355.00 FEET.

 FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.84 B-12
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.828

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	0.10	0.30	0.200	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.10	0.30	0.400	56
COMMERCIAL	B	1.60	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.40	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.524
 SUBAREA AREA(ACRES) = 7.90 SUBAREA RUNOFF(CFS) = 18.99
 EFFECTIVE AREA(ACRES) = 23.50 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 23.5 PEAK FLOW RATE(CFS) = 56.62

 FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.84 B-12
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.828

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"	B	0.10	0.30	0.500	56

RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 4.80 0.30 0.400 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.80 0.30 0.400 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.427
 SUBAREA AREA (ACRES) = 6.00 SUBAREA RUNOFF (CFS) = 14.58
 EFFECTIVE AREA (ACRES) = 29.50 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 29.5 PEAK FLOW RATE (CFS) = 71.20

 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) = 405.00 DOWNSTREAM (FEET) = 400.00
 FLOW LENGTH (FEET) = 376.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.7 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 11.76
 ESTIMATED PIPE DIAMETER (INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 71.20
 PIPE TRAVEL TIME (MIN.) = 0.53 Tc (MIN.) = 13.37
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 215.00 = 1731.00 FEET.

 FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

 MAINLINE Tc (MIN.) = 13.37 **B-13**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.764
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.00	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.40	0.30	0.500	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.349
 SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 19.86
 EFFECTIVE AREA (ACRES) = 37.80 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 37.8 PEAK FLOW RATE (CFS) = 89.36

 FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

 MAINLINE Tc (MIN.) = 13.37 **B-13**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.764
 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"	B	4.10	0.30	0.500	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.500
 SUBAREA AREA (ACRES) = 4.20 SUBAREA RUNOFF (CFS) = 9.88
 EFFECTIVE AREA (ACRES) = 42.00 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 42.0 PEAK FLOW RATE (CFS) = 99.24

 FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

 MAINLINE Tc (MIN.) = 13.37 **B-14**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.764
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.80	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.50	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.30	0.30	0.400	56
PUBLIC PARK	B	1.20	0.30	0.850	56

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.503
 SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 20.46
 EFFECTIVE AREA (ACRES) = 50.70 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA (ACRES) = 50.7 PEAK FLOW RATE (CFS) = 119.70

 FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

 MAINLINE Tc (MIN.) = 13.37 **B-14**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.764
 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	3.00	0.30	0.200	56
RESIDENTIAL					

"4 DWELLING/ACRE"	B	0.90	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.50	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.40	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.80	0.30	0.400	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.80	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.368
SUBAREA AREA(ACRES) = 11.40 SUBAREA RUNOFF(CFS) = 27.23
EFFECTIVE AREA(ACRES) = 62.10 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 62.1 PEAK FLOW RATE(CFS) = 146.92

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.37
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.764 **B-14**
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	0.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.22
EFFECTIVE AREA(ACRES) = 62.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 62.2 PEAK FLOW RATE(CFS) = 147.15

FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 350.00
FLOW LENGTH(FEET) = 1800.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.77
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 147.15
PIPE TRAVEL TIME(MIN.) = 1.60 Tc(MIN.) = 14.97
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 216.00 = 3531.00 FEET.

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.97
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.593
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.50	0.30	0.100	56
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	1.40	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	5.70	0.30	0.400	56
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.70	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.508
SUBAREA AREA(ACRES) = 9.30 SUBAREA RUNOFF(CFS) = 20.43
EFFECTIVE AREA(ACRES) = 71.50 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 71.5 PEAK FLOW RATE(CFS) = 158.00

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.97
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.593 **B-15**
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 2.70 SUBAREA RUNOFF(CFS) = 5.96
EFFECTIVE AREA(ACRES) = 74.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 74.2 PEAK FLOW RATE(CFS) = 163.96

FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.97
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.593 **B-16**
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.30	0.30	0.850	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	2.40	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.80	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.70	0.30	0.400	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	2.00	0.30	0.900	56
RESIDENTIAL					

"5-7 DWELLINGS/ACRE" B 0.90 0.30 0.500 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.644
 SUBAREA AREA (ACRES) = 12.10 SUBAREA RUNOFF (CFS) = 26.13
 EFFECTIVE AREA (ACRES) = 86.30 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 86.3 PEAK FLOW RATE (CFS) = 190.09

 FLOW PROCESS FROM NODE 216.00 TO NODE 216.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 14.97 **B-16**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.593

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 2.10 0.30 0.400 56

RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 1.40 0.30 0.500 56

RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 1.00 0.30 0.400 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.431
 SUBAREA AREA (ACRES) = 4.50 SUBAREA RUNOFF (CFS) = 9.98
 EFFECTIVE AREA (ACRES) = 90.80 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 90.8 PEAK FLOW RATE (CFS) = 200.07

 FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 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) = 350.00 DOWNSTREAM (FEET) = 340.00
 FLOW LENGTH (FEET) = 886.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.3 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 14.56
 ESTIMATED PIPE DIAMETER (INCH) = 57.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 200.07
 PIPE TRAVEL TIME (MIN.) = 1.01 Tc (MIN.) = 15.99
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 217.00 = 4417.00 FEET.

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

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MAINLINE Tc (MIN.) = 15.99 **B-17**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.499

SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

PUBLIC PARK B 0.30 0.30 0.850 56
 RESIDENTIAL

"11+ DWELLINGS/ACRE" B 0.40 0.30 0.200 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.80 0.30 0.200 56
 COMMERCIAL B 0.40 0.30 0.100 56
 PUBLIC PARK B 2.20 0.30 0.850 56
 RESIDENTIAL

"11+ DWELLINGS/ACRE" B 1.00 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.460
 SUBAREA AREA (ACRES) = 6.10 SUBAREA RUNOFF (CFS) = 12.96
 EFFECTIVE AREA (ACRES) = 96.90 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 96.9 PEAK FLOW RATE (CFS) = 205.32

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 15.99 **B-17**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.499

SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL B 5.20 0.30 0.100 56
 PUBLIC PARK B 0.60 0.30 0.850 56
 RESIDENTIAL

"11+ DWELLINGS/ACRE" B 8.60 0.30 0.200 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.191
 SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 31.64
 EFFECTIVE AREA (ACRES) = 111.30 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
 TOTAL AREA (ACRES) = 111.3 PEAK FLOW RATE (CFS) = 236.95

 FLOW PROCESS FROM NODE 217.00 TO NODE 217.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 15.99 **B-18**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.499

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 1.70 0.30 0.200 56
 COMMERCIAL B 4.30 0.30 0.100 56
 PUBLIC PARK B 3.00 0.30 0.850 56
 RESIDENTIAL

"11+ DWELLINGS/ACRE" B 10.30 0.30 0.200 56

RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 3.70 0.30 0.400 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.298
 SUBAREA AREA (ACRES) = 23.00 SUBAREA RUNOFF (CFS) = 49.87
 EFFECTIVE AREA (ACRES) = 134.30 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42

TOTAL AREA (ACRES) = 134.3 PEAK FLOW RATE (CFS) = 286.82

FLOW PROCESS FROM NODE 217.00 TO NODE 221.00 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) = 330.00
FLOW LENGTH(FEET) = 1266.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 51.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.89
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 286.82
PIPE TRAVEL TIME(MIN.) = 1.52 Tc(MIN.) = 17.50
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 17.50
RAINFALL INTENSITY(INCH/HR) = 2.37
AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA(ACRES) = 134.30
TOTAL STREAM AREA(ACRES) = 134.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 286.82

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	133.80	14.79	2.611	0.30(0.12)	0.39	59.6	200.00
2	286.82	17.50	2.373	0.30(0.13)	0.42	134.3	210.00

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	401.73	14.79	2.611	0.30(0.12)	0.41	173.1	200.00
2	407.87	17.50	2.373	0.30(0.12)	0.41	193.9	210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 407.87 Tc(MIN.) = 17.50
EFFECTIVE AREA(ACRES) = 193.90 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 193.9
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 221.00 = 5683.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 222.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 330.00 DOWNSTREAM(FEET) = 280.00
FLOW LENGTH(FEET) = 278.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 49.34
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 407.87
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 17.60
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 222.00 = 5961.00 FEET.

FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.60
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.366 **B-19**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.80 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
COMMERCIAL B 1.90 0.30 0.100 56
AGRICULTURAL FAIR COVER
"ORCHARDS" B 1.30 0.30 1.000 65
RESIDENTIAL
".4 DWELLING/ACRE" B 2.20 0.30 0.900 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 2.50 0.30 0.500 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.517
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 19.90
EFFECTIVE AREA(ACRES) = 203.90 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 203.9 PEAK FLOW RATE(CFS) = 411.39

FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.60
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.366 **B-19**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.10 0.30 1.000 65
COMMERCIAL B 4.70 0.30 0.100 56
NATURAL FAIR COVER
"OPEN BRUSH" B 0.30 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 4.00 0.30 0.900 56
RESIDENTIAL

"5-7 DWELLINGS/ACRE" B 0.60 0.30 0.500 56
NATURAL FAIR COVER
"WOODLAND, GRASS" B 0.40 0.30 1.000 65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512
SUBAREA AREA (ACRES) = 10.10 SUBAREA RUNOFF (CFS) = 20.11
EFFECTIVE AREA (ACRES) = 214.00 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
TOTAL AREA (ACRES) = 214.0 PEAK FLOW RATE (CFS) = 431.50

FLOW PROCESS FROM NODE 222.00 TO NODE 222.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 17.60
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.366 **B-19**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
AGRICULTURAL FAIR COVER
"ORCHARDS" B 0.60 0.30 1.000 65
RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.986
SUBAREA AREA (ACRES) = 0.70 SUBAREA RUNOFF (CFS) = 1.30
EFFECTIVE AREA (ACRES) = 214.70 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
TOTAL AREA (ACRES) = 214.7 PEAK FLOW RATE (CFS) = 432.81

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 214.7 TC (MIN.) = 17.60
EFFECTIVE AREA (ACRES) = 214.70 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.421
PEAK FLOW RATE (CFS) = 432.81

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	431.83	14.88	2.602	0.30 (0.13)	0.42	193.9	200.00
2	432.81	17.60	2.366	0.30 (0.13)	0.42	214.7	210.00

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 SUBAREA C ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 2-YR EV DECEMBER 2018 CCHIUI *

FILE NAME: PA3C02EV.DAT
TIME/DATE OF STUDY: 13:19 12/13/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 1.600
- 2) 10.00; 1.060
- 3) 15.00; 0.840
- 4) 20.00; 0.720
- 5) 25.00; 0.630
- 6) 30.00; 0.560
- 7) 40.00; 0.480
- 8) 50.00; 0.420
- 9) 60.00; 0.366
- 10) 90.00; 0.300
- 11) 120.00; 0.246
- 12) 180.00; 0.190
- 13) 360.00; 0.136
- 14) 1200.00; 0.080

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 (FT)	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:

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) = 320.00
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.) = 6.766
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.409
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	-	0.20	0.60	0.100	0	6.77
PUBLIC PARK	-	0.90	0.60	0.850	0	10.75
COMMERCIAL	-	0.30	0.60	0.100	0	6.77
PUBLIC PARK	-	1.90	0.60	0.850	0	10.75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.736
SUBAREA RUNOFF(CFS) = 2.87
TOTAL AREA(ACRES) = 3.30 PEAK FLOW RATE(CFS) = 2.87

C-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) = 634.00 DOWNSTREAM ELEVATION(FEET) = 630.00
STREET LENGTH(FEET) = 503.00 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

C-3

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) = 5.79
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.37
HALFSTREET FLOOD WIDTH(FEET) = 11.52
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.10
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.77
STREET FLOW TRAVEL TIME(MIN.) = 4.00 Tc(MIN.) = 10.76
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.026

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.60	0.100	-
USER-DEFINED	-	2.10	0.60	0.850	-
USER-DEFINED	-	4.60	0.60	0.600	-
USER-DEFINED	-	0.30	0.60	0.100	-
USER-DEFINED	-	1.40	0.60	0.850	-
USER-DEFINED	-	1.10	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.648
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 5.74
EFFECTIVE AREA(ACRES) = 13.30 AREA-AVERAGED Fm(INCH/HR) = 0.40
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) = 13.3 PEAK FLOW RATE(CFS) = 7.48

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 12.93
FLOW VELOCITY(FEET/SEC.) = 2.22 DEPTH*VELOCITY(FT*FT/SEC.) = 0.87
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 823.00 FEET.

FLOW PROCESS FROM NODE 302.00 TO NODE 302.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.76
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.026

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.00	0.60	0.850	-
USER-DEFINED	-	9.30	0.60	0.200	-
USER-DEFINED	-	0.40	0.60	0.850	-
USER-DEFINED	-	1.30	0.60	0.200	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.276
SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 9.30
EFFECTIVE AREA(ACRES) = 25.30 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 25.3 PEAK FLOW RATE(CFS) = 16.78

C-2

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) = 630.00 DOWNSTREAM(FEET) = 625.00
FLOW LENGTH(FEET) = 651.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.77
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.78
PIPE TRAVEL TIME(MIN.) = 1.60 Tc(MIN.) = 12.37
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1474.00 FEET.

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.37
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.956

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.40	0.60	0.100	-
USER-DEFINED	-	0.40	0.60	0.850	-
USER-DEFINED	-	1.80	0.60	0.400	-
USER-DEFINED	-	1.30	0.60	0.600	-
USER-DEFINED	-	0.60	0.60	0.100	-
USER-DEFINED	-	0.60	0.60	0.850	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.480
SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 3.06
EFFECTIVE AREA(ACRES) = 30.40 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 30.4 PEAK FLOW RATE(CFS) = 18.23

C-5

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.37
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.956

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.50	0.60	0.400	-
USER-DEFINED	-	5.20	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.520
SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 5.04
EFFECTIVE AREA(ACRES) = 39.10 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 39.1 PEAK FLOW RATE(CFS) = 23.28

C-5

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.37
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.956

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.80	0.60	0.100	-
USER-DEFINED	-	0.40	0.60	0.850	-
USER-DEFINED	-	7.40	0.60	0.200	-
USER-DEFINED	-	0.30	0.60	0.850	-
USER-DEFINED	-	0.50	0.60	0.200	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.215

C-4

SUBAREA AREA (ACRES) = 11.40 SUBAREA RUNOFF (CFS) = 8.48
EFFECTIVE AREA (ACRES) = 50.50 AREA-AVERAGED Fm (INCH/HR) = 0.26
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.43
TOTAL AREA (ACRES) = 50.5 PEAK FLOW RATE (CFS) = 31.76

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 12.37
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.956 **C-6**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 4.70 0.60 0.100 -
USER-DEFINED - 2.30 0.60 0.850 -
USER-DEFINED - 4.90 0.60 0.200 -
USER-DEFINED - 1.70 0.60 0.100 -
USER-DEFINED - 1.80 0.60 0.850 -
USER-DEFINED - 6.20 0.60 0.200 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.294
SUBAREA AREA (ACRES) = 21.60 SUBAREA RUNOFF (CFS) = 15.16
EFFECTIVE AREA (ACRES) = 72.10 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.39
TOTAL AREA (ACRES) = 72.1 PEAK FLOW RATE (CFS) = 46.92

FLOW PROCESS FROM NODE 303.00 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) = 625.00 DOWNSTREAM (FEET) = 615.00
FLOW LENGTH (FEET) = 1029.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 9.48
ESTIMATED PIPE DIAMETER (INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 46.92
PIPE TRAVEL TIME (MIN.) = 1.81 Tc (MIN.) = 14.18
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 305.00 = 2503.00 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 14.18
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.876 **C-7**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.10 0.60 0.100 -
USER-DEFINED - 1.80 0.60 0.850 -
USER-DEFINED - 1.00 0.60 0.200 -
USER-DEFINED - 5.00 0.60 0.400 -
USER-DEFINED - 2.80 0.60 0.100 -

USER-DEFINED - 0.90 0.60 0.850 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.367
SUBAREA AREA (ACRES) = 13.60 SUBAREA RUNOFF (CFS) = 8.03
EFFECTIVE AREA (ACRES) = 85.70 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.38
TOTAL AREA (ACRES) = 85.7 PEAK FLOW RATE (CFS) = 49.78

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 14.18
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.876 **C-7**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.80 0.60 0.200 -
USER-DEFINED - 1.20 0.60 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.280
SUBAREA AREA (ACRES) = 3.00 SUBAREA RUNOFF (CFS) = 1.91
EFFECTIVE AREA (ACRES) = 88.70 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.38
TOTAL AREA (ACRES) = 88.7 PEAK FLOW RATE (CFS) = 51.70

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 14.18
RAINFALL INTENSITY (INCH/HR) = 0.88
AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.38
EFFECTIVE STREAM AREA (ACRES) = 88.70
TOTAL STREAM AREA (ACRES) = 88.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 51.70

FLOW PROCESS FROM NODE 306.00 TO NODE 307.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH (FEET) = 317.00
ELEVATION DATA: UPSTREAM (FEET) = 646.00 DOWNSTREAM (FEET) = 645.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)] ** 0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 15.296 **C-8**
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.833
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.)

PUBLIC PARK - 0.40 0.60 0.850 0 15.30
 RESIDENTIAL
 ".4 DWELLING/ACRE" - 0.10 0.60 0.900 0 15.42
 PUBLIC PARK - 1.50 0.60 0.850 0 15.30
 RESIDENTIAL
 ".4 DWELLING/ACRE" - 0.20 0.60 0.900 0 15.42
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.857
 SUBAREA RUNOFF (CFS) = 0.63
 TOTAL AREA (ACRES) = 2.20 PEAK FLOW RATE (CFS) = 0.63

 FLOW PROCESS FROM NODE 307.00 TO NODE 307.10 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<
 =====
 UPSTREAM ELEVATION (FEET) = 645.00 DOWNSTREAM ELEVATION (FEET) = 641.00
 STREET LENGTH (FEET) = 375.00 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

C-8.1

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) = 1.32
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH (FEET) = 0.24
 HALFSTREET FLOOD WIDTH (FEET) = 4.22
 AVERAGE FLOW VELOCITY (FEET/SEC.) = 1.87
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 0.45
 STREET FLOW TRAVEL TIME (MIN.) = 3.34 Tc (MIN.) = 18.64
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.753
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.40	0.60	0.850	-
USER-DEFINED	-	2.00	0.60	0.600	-
USER-DEFINED	-	0.30	0.60	0.850	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	1.40	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.649
 SUBAREA AREA (ACRES) = 4.20 SUBAREA RUNOFF (CFS) = 1.37
 EFFECTIVE AREA (ACRES) = 6.40 AREA-AVERAGED Fm (INCH/HR) = 0.43
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.72
 TOTAL AREA (ACRES) = 6.4 PEAK FLOW RATE (CFS) = 1.85

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.26 HALFSTREET FLOOD WIDTH (FEET) = 5.72
 FLOW VELOCITY (FEET/SEC.) = 1.90 DEPTH*VELOCITY (FT*FT/SEC.) = 0.50
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 307.10 = 692.00 FEET.

 FLOW PROCESS FROM NODE 307.10 TO NODE 308.00 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<
 =====
 UPSTREAM ELEVATION (FEET) = 641.00 DOWNSTREAM ELEVATION (FEET) = 635.00
 STREET LENGTH (FEET) = 506.00 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

C-9

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.16
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH (FEET) = 0.30
 HALFSTREET FLOOD WIDTH (FEET) = 7.72
 AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.17
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 0.65
 STREET FLOW TRAVEL TIME (MIN.) = 3.88 Tc (MIN.) = 22.51
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.675
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.00	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	0.850	-
USER-DEFINED	-	4.80	0.60	0.600	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	2.30	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.554
 SUBAREA AREA (ACRES) = 8.50 SUBAREA RUNOFF (CFS) = 2.62
 EFFECTIVE AREA (ACRES) = 14.90 AREA-AVERAGED Fm (INCH/HR) = 0.38
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.63
 TOTAL AREA (ACRES) = 14.9 PEAK FLOW RATE (CFS) = 4.02

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.32 HALFSTREET FLOOD WIDTH (FEET) = 8.78
 FLOW VELOCITY (FEET/SEC.) = 2.28 DEPTH*VELOCITY (FT*FT/SEC.) = 0.73
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 308.00 = 1198.00 FEET.

 FLOW PROCESS FROM NODE 308.00 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) = 635.00 DOWNSTREAM (FEET) = 615.00
 FLOW LENGTH (FEET) = 1516.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 5.91

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.02
 PIPE TRAVEL TIME(MIN.) = 4.27 Tc(MIN.) = 26.79
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 26.79
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.605

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.20	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.850	-
USER-DEFINED	-	2.20	0.60	0.200	-
USER-DEFINED	-	0.80	0.60	0.600	-
USER-DEFINED	-	0.50	0.60	0.400	-
USER-DEFINED	-	0.20	0.60	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.289
 SUBAREA AREA(ACRES) = 5.00 SUBAREA RUNOFF(CFS) = 1.94
 EFFECTIVE AREA(ACRES) = 19.90 AREA-AVERAGED Fm(INCH/HR) = 0.32
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 19.9 PEAK FLOW RATE(CFS) = 5.03

C-10

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 26.79
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.605

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.20	0.60	0.100	-
USER-DEFINED	-	0.20	0.60	0.850	-
USER-DEFINED	-	2.30	0.60	0.200	-
USER-DEFINED	-	0.30	0.60	0.900	-
USER-DEFINED	-	4.00	0.60	0.600	-
USER-DEFINED	-	6.60	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.415
 SUBAREA AREA(ACRES) = 14.60 SUBAREA RUNOFF(CFS) = 4.68
 EFFECTIVE AREA(ACRES) = 34.50 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 34.5 PEAK FLOW RATE(CFS) = 9.70

C-10

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 26.79
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.605

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.60	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.04
 EFFECTIVE AREA(ACRES) = 34.70 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 34.7 PEAK FLOW RATE(CFS) = 9.75

C-10

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 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.) = 26.79
 RAINFALL INTENSITY(INCH/HR) = 0.60
 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.60
 AREA-AVERAGED Ap = 0.49
 EFFECTIVE STREAM AREA(ACRES) = 34.70
 TOTAL STREAM AREA(ACRES) = 34.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.75

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	51.70	14.18	0.876	0.60(0.23)	0.38	88.7	300.00
2	9.75	26.79	0.605	0.60(0.29)	0.49	34.7	306.00

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 (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	61.34	14.18	0.876	0.60(0.24)	0.40	107.1	300.00
2	39.79	26.79	0.605	0.60(0.25)	0.41	123.4	306.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 61.34 Tc(MIN.) = 14.18
 EFFECTIVE AREA(ACRES) = 107.07 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.40
 TOTAL AREA(ACRES) = 123.4
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

 FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 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) = 480.00
 FLOW LENGTH(FEET) = 2954.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.00
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 61.34
 PIPE TRAVEL TIME(MIN.) = 2.73 Tc(MIN.) = 16.91
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 310.00 = 5668.00 FEET.

 FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.91 C-11
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.794
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.80	0.60	0.100	-
USER-DEFINED	-	0.40	0.60	0.900	-
USER-DEFINED	-	0.20	0.60	0.600	-
USER-DEFINED	-	2.30	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.164
 SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 4.88
 EFFECTIVE AREA(ACRES) = 114.87 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.38
 TOTAL AREA(ACRES) = 131.2 PEAK FLOW RATE(CFS) = 61.34
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.91 C-12
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.794
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.100	-
USER-DEFINED	-	0.20	0.60	0.850	-
USER-DEFINED	-	2.30	0.60	0.850	-
USER-DEFINED	-	6.40	0.60	0.200	-
USER-DEFINED	-	2.60	0.60	0.200	-
USER-DEFINED	-	0.70	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.371
 SUBAREA AREA(ACRES) = 12.30 SUBAREA RUNOFF(CFS) = 6.33
 EFFECTIVE AREA(ACRES) = 127.17 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.38
 TOTAL AREA(ACRES) = 143.5 PEAK FLOW RATE(CFS) = 64.64

 FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.91 C-12
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.794
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.20	0.60	0.900	-
USER-DEFINED	-	0.10	0.60	0.600	-
USER-DEFINED	-	0.80	0.60	0.500	-
USER-DEFINED	-	10.20	0.60	0.500	-
USER-DEFINED	-	2.50	0.60	0.400	-
USER-DEFINED	-	3.70	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.514
 SUBAREA AREA(ACRES) = 19.50 SUBAREA RUNOFF(CFS) = 8.53
 EFFECTIVE AREA(ACRES) = 146.67 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.40
 TOTAL AREA(ACRES) = 163.0 PEAK FLOW RATE(CFS) = 73.17

 FLOW PROCESS FROM NODE 310.00 TO NODE 311.00 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) = 430.00
 FLOW LENGTH(FEET) = 1056.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.41
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 73.17
 PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 17.82
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 311.00 = 6724.00 FEET.

 FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.82 C-13
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.772
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.60	0.60	0.100	-
USER-DEFINED	-	3.60	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.850	-
USER-DEFINED	-	3.90	0.60	0.200	-
USER-DEFINED	-	5.10	0.60	0.200	-
USER-DEFINED	-	0.80	0.60	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.191
 SUBAREA AREA(ACRES) = 15.10 SUBAREA RUNOFF(CFS) = 8.94
 EFFECTIVE AREA(ACRES) = 161.77 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.38
 TOTAL AREA(ACRES) = 178.1 PEAK FLOW RATE(CFS) = 79.23

 FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.82
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.772
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 6.70 0.60 0.600 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 2.49
EFFECTIVE AREA(ACRES) = 168.47 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 184.8 PEAK FLOW RATE(CFS) = 81.72

C-13

FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 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) = 373.00
FLOW LENGTH(FEET) = 1373.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.12
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 81.72
PIPE TRAVEL TIME(MIN.) = 1.20 Tc(MIN.) = 19.02
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 312.00 = 8097.00 FEET.

FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.02
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.744
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.50 0.60 0.100 -
USER-DEFINED - 4.50 0.60 0.100 -
USER-DEFINED - 3.40 0.60 0.200 -
USER-DEFINED - 0.30 0.60 0.100 -
USER-DEFINED - 0.10 0.60 0.850 -
USER-DEFINED - 0.20 0.60 0.900 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.157
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 5.84
EFFECTIVE AREA(ACRES) = 178.47 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 194.8 PEAK FLOW RATE(CFS) = 83.21

C-42

FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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

=====
MAINLINE Tc(MIN.) = 19.02
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.744
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.10 0.60 0.900 -
USER-DEFINED - 0.40 0.60 0.500 -
USER-DEFINED - 0.10 0.60 0.500 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.567
SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 0.22
EFFECTIVE AREA(ACRES) = 179.07 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 195.4 PEAK FLOW RATE(CFS) = 83.42

C-42

FLOW PROCESS FROM NODE 312.00 TO NODE 339.00 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) = 301.00
FLOW LENGTH(FEET) = 1370.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.65
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 83.42
PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 20.12
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<
=====

FLOW PROCESS FROM NODE 390.00 TO NODE 391.00 IS CODE = 21

>>>>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

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.195
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.147
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.)

OC-1

NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF" - 0.20 0.60 1.000 0 9.20
 NATURAL FAIR COVER
 "OPEN BRUSH" - 1.20 0.60 1.000 0 9.20
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 0.69
 TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 0.69

FLOW PROCESS FROM NODE 391.00 TO NODE 392.00 IS CODE = 51

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

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
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.990

OC-2

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.70	0.60	1.000	-
USER-DEFINED	-	0.60	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 1.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.81
 AVERAGE FLOW DEPTH (FEET) = 0.31 TRAVEL TIME (MIN.) = 2.38
 Tc (MIN.) = 11.58
 SUBAREA AREA (ACRES) = 2.30 SUBAREA RUNOFF (CFS) = 0.81
 EFFECTIVE AREA (ACRES) = 3.70 AREA-AVERAGED Fm (INCH/HR) = 0.60
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 3.7 PEAK FLOW RATE (CFS) = 1.30

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.33 FLOW VELOCITY (FEET/SEC.) = 3.96
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 392.00 = 862.00 FEET.

 FLOW PROCESS FROM NODE 392.00 TO NODE 393.00 IS CODE = 51

>>>>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
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.805

OC-3

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.40	0.60	1.000	-
USER-DEFINED	-	8.40	0.60	1.000	-
USER-DEFINED	-	2.70	0.60	1.000	-
USER-DEFINED	-	0.40	0.60	1.000	-

USER-DEFINED - 9.20 0.60 1.000 -
 USER-DEFINED - 0.60 0.60 1.000 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.74
 AVERAGE FLOW DEPTH (FEET) = 0.56 TRAVEL TIME (MIN.) = 4.88
 Tc (MIN.) = 16.46
 SUBAREA AREA (ACRES) = 22.70 SUBAREA RUNOFF (CFS) = 4.19
 EFFECTIVE AREA (ACRES) = 26.40 AREA-AVERAGED Fm (INCH/HR) = 0.60
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 26.4 PEAK FLOW RATE (CFS) = 4.87

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.63 FLOW VELOCITY (FEET/SEC.) = 4.09
 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
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.710

OC-4

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.60	0.60	1.000	-
USER-DEFINED	-	5.50	0.60	1.000	-
USER-DEFINED	-	1.80	0.60	1.000	-
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	1.00	0.60	1.000	-
USER-DEFINED	-	6.80	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 5.75
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.68
 AVERAGE FLOW DEPTH (FEET) = 0.72 TRAVEL TIME (MIN.) = 4.10
 Tc (MIN.) = 20.55
 SUBAREA AREA (ACRES) = 17.30 SUBAREA RUNOFF (CFS) = 1.72
 EFFECTIVE AREA (ACRES) = 43.70 AREA-AVERAGED Fm (INCH/HR) = 0.60
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 43.7 PEAK FLOW RATE (CFS) = 4.87
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.68 FLOW VELOCITY (FEET/SEC.) = 3.55
 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.) = 20.55
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.710
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 2.50 0.60 1.000 -
 USER-DEFINED - 0.10 0.60 1.000 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 0.26
 EFFECTIVE AREA(ACRES) = 46.30 AREA-AVERAGED Fm(INCH/HR) = 0.60
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 46.3 PEAK FLOW RATE(CFS) = 4.87
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 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) = 664.00 CHANNEL SLOPE = 0.0377
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.654
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 6.30 0.60 1.000 -
 USER-DEFINED - 5.90 0.60 1.000 -
 USER-DEFINED - 6.80 0.60 1.000 -
 USER-DEFINED - 0.90 0.60 0.900 -
 USER-DEFINED - 0.50 0.60 1.000 -
 USER-DEFINED - 0.20 0.60 1.000 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.996
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.41
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.53
 AVERAGE FLOW DEPTH(FEET) = 0.71 TRAVEL TIME(MIN.) = 3.13
 Tc(MIN.) = 23.69
 SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 1.05
 EFFECTIVE AREA(ACRES) = 66.90 AREA-AVERAGED Fm(INCH/HR) = 0.60
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 66.9 PEAK FLOW RATE(CFS) = 4.87
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.69 FLOW VELOCITY(FEET/SEC.) = 3.42
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 395.00 = 3523.00 FEET.

 FLOW PROCESS FROM NODE 395.00 TO NODE 395.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 23.69
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.654

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 12.60 0.60 1.000 -
 USER-DEFINED - 3.10 0.60 1.000 -
 USER-DEFINED - 2.40 0.60 0.900 -
 USER-DEFINED - 0.10 0.60 1.000 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.987
 SUBAREA AREA(ACRES) = 18.20 SUBAREA RUNOFF(CFS) = 1.01
 EFFECTIVE AREA(ACRES) = 85.10 AREA-AVERAGED Fm(INCH/HR) = 0.60
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 85.1 PEAK FLOW RATE(CFS) = 4.87
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 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) = 389.00
 FLOW LENGTH(FEET) = 5717.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.61
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.87
 PIPE TRAVEL TIME(MIN.) = 11.06 Tc(MIN.) = 34.75
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 370.00 = 9240.00 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) = 389.00 DOWNSTREAM(FEET) = 345.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1996.00 CHANNEL SLOPE = 0.0220
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.441

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 2.90 0.60 1.000 -
 USER-DEFINED - 4.40 0.60 1.000 -
 USER-DEFINED - 0.50 0.60 0.100 -
 USER-DEFINED - 6.60 0.60 1.000 -
 USER-DEFINED - 3.60 0.60 1.000 -
 USER-DEFINED - 6.10 0.60 0.900 -

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.956
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.09
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.83
 AVERAGE FLOW DEPTH(FEET) = 0.77 TRAVEL TIME(MIN.) = 11.74

Tc(MIN.) = 46.48
 SUBAREA AREA(ACRES) = 24.10 SUBAREA RUNOFF(CFS) = 0.42
 EFFECTIVE AREA(ACRES) = 109.20 AREA-AVERAGED Fm(INCH/HR) = 0.59
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.99
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) = 109.2 PEAK FLOW RATE(CFS) = 4.87
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.76 FLOW VELOCITY(FEET/SEC.) = 2.81
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 371.00 = 11236.00 FEET.

 FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

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

 FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 46.48
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.441
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.10	0.60	1.000	-
USER-DEFINED	-	1.10	0.60	0.100	-
USER-DEFINED	-	2.00	0.60	1.000	-
USER-DEFINED	-	0.40	0.60	1.000	-
USER-DEFINED	-	2.20	0.60	0.900	-
USER-DEFINED	-	0.30	0.60	1.000	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.830
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 0.48
 EFFECTIVE AREA(ACRES) = 116.30 AREA-AVERAGED Fm(INCH/HR) = 0.59
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.98
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) = 116.3 PEAK FLOW RATE(CFS) = 4.87
 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<<<<<

 FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 46.48
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.441
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.70	0.60	0.900	-
USER-DEFINED	-	0.20	0.60	1.000	-
USER-DEFINED	-	0.10	0.60	0.850	-
USER-DEFINED	-	0.10	0.60	0.500	-
USER-DEFINED	-	3.00	0.60	1.000	-
USER-DEFINED	-	1.40	0.60	1.000	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

C-50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.975
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 SUBAREA AREA(ACRES) = 5.50 SUBAREA RUNOFF(CFS) = 0.05
 EFFECTIVE AREA(ACRES) = 121.80 AREA-AVERAGED Fm(INCH/HR) = 0.59
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.98
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) = 121.8 PEAK FLOW RATE(CFS) = 4.87
 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<<<<<

 FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 46.48
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.441
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.40	0.60	0.900	-
USER-DEFINED	-	0.10	0.60	1.000	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.907
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 0.06
 EFFECTIVE AREA(ACRES) = 123.30 AREA-AVERAGED Fm(INCH/HR) = 0.59
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.98
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) = 123.3 PEAK FLOW RATE(CFS) = 4.87
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

C-50

 FLOW PROCESS FROM NODE 371.00 TO NODE 372.00 IS CODE = 31

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

 FLOW PROCESS FROM NODE 371.00 TO NODE 372.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 345.00 DOWNSTREAM(FEET) = 301.00
 FLOW LENGTH(FEET) = 488.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.47
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 4.87
 PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 47.14
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 372.00 = 11724.00 FEET.

 FLOW PROCESS FROM NODE 372.00 TO NODE 373.00 IS CODE = 56

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

 FLOW PROCESS FROM NODE 372.00 TO NODE 373.00 IS CODE = 56

 >>>>TRAVELTIME THRU SUBAREA<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 301.00 DOWNSTREAM(FEET) = 300.00

CHANNEL LENGTH THRU SUBAREA (FEET) = 924.00 CHANNEL SLOPE = 0.0011
 GIVEN CHANNEL BASE (FEET) = 30.00 CHANNEL FREEBOARD (FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 * ESTIMATED CHANNEL HEIGHT (FEET) = 1.28
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.355

C-60

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	32.30	0.60	0.100	-
USER-DEFINED	-	2.70	0.60	0.100	-
USER-DEFINED	-	0.60	0.60	0.100	-
USER-DEFINED	-	1.80	0.60	0.100	-
USER-DEFINED	-	7.20	0.60	0.850	-
USER-DEFINED	-	9.80	0.60	0.850	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.334
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 10.50
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 0.85
 AVERAGE FLOW DEPTH (FEET) = 0.39 TRAVEL TIME (MIN.) = 18.01
 Tc (MIN.) = 65.15
 SUBAREA AREA (ACRES) = 54.40 SUBAREA RUNOFF (CFS) = 11.56
 EFFECTIVE AREA (ACRES) = 177.70 AREA-AVERAGED Fm (INCH/HR) = 0.47
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.78
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA (ACRES) = 177.7 PEAK FLOW RATE (CFS) = 12.48
 GIVEN CHANNEL BASE (FEET) = 30.00 CHANNEL FREEBOARD (FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 * ESTIMATED CHANNEL HEIGHT (FEET) = 1.44

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.44 FLOW VELOCITY (FEET/SEC.) = 0.91
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 373.00 = 12648.00 FEET.

 FLOW PROCESS FROM NODE 373.00 TO NODE 373.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 65.15
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.355

C-60

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.60	0.60	0.850	-
USER-DEFINED	-	2.10	0.60	0.850	-
USER-DEFINED	-	3.50	0.60	0.900	-
USER-DEFINED	-	4.80	0.60	0.900	-
USER-DEFINED	-	3.60	0.60	0.900	-
USER-DEFINED	-	0.80	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.886
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 SUBAREA AREA (ACRES) = 17.40 SUBAREA RUNOFF (CFS) = 0.63
 EFFECTIVE AREA (ACRES) = 195.10 AREA-AVERAGED Fm (INCH/HR) = 0.47

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.79
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA (ACRES) = 195.1 PEAK FLOW RATE (CFS) = 13.11

 FLOW PROCESS FROM NODE 373.00 TO NODE 374.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 300.00 DOWNSTREAM (FEET) = 298.00
 FLOW LENGTH (FEET) = 1188.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.7 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 3.63
 ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 13.11
 PIPE TRAVEL TIME (MIN.) = 5.45 Tc (MIN.) = 70.60
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

 FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 13

>>>> CLEAR THE MAIN-STREAM MEMORY <<<<<<
 =====

 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) = 622.00 DOWNSTREAM (FEET) = 621.00

Tc = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 10.511
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.038

C-15

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.)
APARTMENTS	-	1.50	0.60	0.200	0	10.51
APARTMENTS	-	2.00	0.60	0.200	0	10.51

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA RUNOFF (CFS) = 2.89
 TOTAL AREA (ACRES) = 3.50 PEAK FLOW RATE (CFS) = 2.89

 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) = 621.00 DOWNSTREAM ELEVATION(FEET) = 612.00
STREET LENGTH(FEET) = 569.00 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) = 4.74
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 8.91
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.63
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.85
STREET FLOW TRAVEL TIME(MIN.) = 3.61 Tc(MIN.) = 14.12
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.879

C-16

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.20 0.60 0.200 -
USER-DEFINED - 3.20 0.60 0.200 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 3.69
EFFECTIVE AREA(ACRES) = 8.90 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 8.9 PEAK FLOW RATE(CFS) = 6.08

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 10.04
FLOW VELOCITY(FEET/SEC.) = 2.78 DEPTH*VELOCITY(FT*FT/SEC.) = 0.95
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 322.00 = 899.00 FEET.

FLOW PROCESS FROM NODE 322.00 TO NODE 324.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 612.00 DOWNSTREAM ELEVATION(FEET) = 590.00
STREET LENGTH(FEET) = 891.00 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) = 8.82
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.36
HALFSTREET FLOOD WIDTH(FEET) = 10.82
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.56
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.27
STREET FLOW TRAVEL TIME(MIN.) = 4.17 Tc(MIN.) = 18.29
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.761

C-17

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 3.00 0.60 0.400 -
USER-DEFINED - 5.70 0.60 0.400 -
USER-DEFINED - 1.20 0.60 0.350 -
USER-DEFINED - 0.30 0.60 0.850 -
USER-DEFINED - 0.90 0.60 0.850 -
USER-DEFINED - 0.80 0.60 0.100 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.420
SUBAREA AREA(ACRES) = 11.90 SUBAREA RUNOFF(CFS) = 5.45
EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 10.59

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.76
FLOW VELOCITY(FEET/SEC.) = 3.71 DEPTH*VELOCITY(FT*FT/SEC.) = 1.38
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 324.00 = 1790.00 FEET.

FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.29
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.761

C-17

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.70 0.60 0.100 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.70 SUBAREA RUNOFF(CFS) = 1.07
EFFECTIVE AREA(ACRES) = 22.50 AREA-AVERAGED Fm(INCH/HR) = 0.19
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 22.5 PEAK FLOW RATE(CFS) = 11.66

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) = 590.00 DOWNSTREAM(FEET) = 575.00
FLOW LENGTH(FEET) = 529.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.26

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.66
PIPE TRAVEL TIME(MIN.) = 0.86 Tc(MIN.) = 19.15
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 325.00 = 2319.00 FEET.

FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.15
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.740 **C-18**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.50 0.60 0.100 -
USER-DEFINED - 4.30 0.60 0.600 -
USER-DEFINED - 0.30 0.60 0.100 -
USER-DEFINED - 2.10 0.60 0.600 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.544
SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 2.68
EFFECTIVE AREA(ACRES) = 29.70 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 29.7 PEAK FLOW RATE(CFS) = 13.92

FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.15
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.740 **C-18**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.10 0.60 0.850 -
USER-DEFINED - 0.20 0.60 0.900 -
USER-DEFINED - 4.80 0.60 0.600 -
USER-DEFINED - 10.20 0.60 0.600 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.606
SUBAREA AREA(ACRES) = 15.30 SUBAREA RUNOFF(CFS) = 5.19
EFFECTIVE AREA(ACRES) = 45.00 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 45.0 PEAK FLOW RATE(CFS) = 19.11

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) = 575.00 DOWNSTREAM(FEET) = 515.00
FLOW LENGTH(FEET) = 284.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.75

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.11
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 19.34
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 326.00 = 2603.00 FEET.

FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.34
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.736 **C-14**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.70 0.60 0.100 -
USER-DEFINED - 0.10 0.60 0.850 -
USER-DEFINED - 0.80 0.60 0.900 -
USER-DEFINED - 1.40 0.60 0.100 -
USER-DEFINED - 2.30 0.60 0.900 -
USER-DEFINED - 0.10 0.60 0.600 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.582
SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 1.88
EFFECTIVE AREA(ACRES) = 50.40 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 20.81

FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.34
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.736 **C-14**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.10 0.60 0.100 -
USER-DEFINED - 2.80 0.60 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.557
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 1.77
EFFECTIVE AREA(ACRES) = 55.30 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 55.3 PEAK FLOW RATE(CFS) = 22.58

FLOW PROCESS FROM NODE 326.00 TO NODE 333.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 515.00 DOWNSTREAM(FEET) = 500.00
FLOW LENGTH(FEET) = 1644.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.85
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 22.58
PIPE TRAVEL TIME(MIN.) = 3.49 Tc(MIN.) = 22.83
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 22.83 **C-20**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.669
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.40 0.60 0.100 -
USER-DEFINED - 2.20 0.60 0.900 -
USER-DEFINED - 1.80 0.60 0.100 -
USER-DEFINED - 0.30 0.60 0.900 -
USER-DEFINED - 5.60 0.60 0.100 -
USER-DEFINED - 4.10 0.60 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 5.04
EFFECTIVE AREA(ACRES) = 69.70 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 69.7 PEAK FLOW RATE(CFS) = 24.30

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 22.83 **C-20**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.669
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.20 0.60 0.600 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.06
EFFECTIVE AREA(ACRES) = 69.90 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 69.9 PEAK FLOW RATE(CFS) = 24.35

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 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.) = 22.83
RAINFALL INTENSITY(INCH/HR) = 0.67
AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.47
EFFECTIVE STREAM AREA(ACRES) = 69.90

TOTAL STREAM AREA(ACRES) = 69.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 24.35

FLOW PROCESS FROM NODE 327.00 TO NODE 327.50 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) = 615.00 DOWNSTREAM(FEET) = 614.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.844 **C-21**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.077
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 - 0.40 0.60 0.100 0 9.84
PUBLIC PARK - 0.20 0.60 0.850 0 15.64
RESIDENTIAL
"8-10 DWELLINGS/ACRE" - 0.10 0.60 0.400 0 12.11
COMMERCIAL - 0.10 0.60 0.100 0 9.84
PUBLIC PARK - 0.10 0.60 0.850 0 15.64
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.383
SUBAREA RUNOFF(CFS) = 0.69
TOTAL AREA(ACRES) = 0.90 PEAK FLOW RATE(CFS) = 0.69

FLOW PROCESS FROM NODE 327.50 TO NODE 328.00 IS CODE = 62

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

=====

UPSTREAM ELEVATION(FEET) = 614.00 DOWNSTREAM ELEVATION(FEET) = 610.00
STREET LENGTH(FEET) = 425.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00 **C-21.1**

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) = 1.67
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.26
HALFSTREET FLOOD WIDTH(FEET) = 5.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.79
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.47
STREET FLOW TRAVEL TIME(MIN.) = 3.95 Tc(MIN.) = 13.80
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.893
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	1.00	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	0.850	-
USER-DEFINED	-	0.20	0.60	0.400	-
USER-DEFINED	-	0.90	0.60	0.100	-
USER-DEFINED	-	0.60	0.60	0.850	-
USER-DEFINED	-	0.20	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.348
SUBAREA AREA (ACRES) = 3.20 SUBAREA RUNOFF (CFS) = 1.97
EFFECTIVE AREA (ACRES) = 4.10 AREA-AVERAGED Fm (INCH/HR) = 0.21
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.36
TOTAL AREA (ACRES) = 4.1 PEAK FLOW RATE (CFS) = 2.51

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.29 HALFSTREET FLOOD WIDTH (FEET) = 7.22
FLOW VELOCITY (FEET/SEC.) = 1.90 DEPTH*VELOCITY (FT*FT/SEC.) = 0.55
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 328.00 = 754.00 FEET.

FLOW PROCESS FROM NODE 328.00 TO NODE 329.00 IS CODE = 62

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

UPSTREAM ELEVATION (FEET) = 610.00 DOWNSTREAM ELEVATION (FEET) = 595.00
STREET LENGTH (FEET) = 366.00 CURB HEIGHT (INCHES) = 8.0
STREET HALFWIDTH (FEET) = 30.00

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 4.17

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.27
HALFSTREET FLOOD WIDTH (FEET) = 6.28
AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.82
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.05

STREET FLOW TRAVEL TIME (MIN.) = 1.60 Tc (MIN.) = 15.39

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.831

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.100	-
USER-DEFINED	-	0.20	0.60	0.850	-
USER-DEFINED	-	3.10	0.60	0.400	-
USER-DEFINED	-	0.50	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	0.850	-
USER-DEFINED	-	2.10	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407

SUBAREA AREA (ACRES) = 6.30 SUBAREA RUNOFF (CFS) = 3.32

C-22

EFFECTIVE AREA (ACRES) = 10.40 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.39
TOTAL AREA (ACRES) = 10.4 PEAK FLOW RATE (CFS) = 5.60

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.30 HALFSTREET FLOOD WIDTH (FEET) = 7.53
FLOW VELOCITY (FEET/SEC.) = 4.00 DEPTH*VELOCITY (FT*FT/SEC.) = 1.19
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 329.00 = 1120.00 FEET.

FLOW PROCESS FROM NODE 329.00 TO NODE 329.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 15.39

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.831

C-23

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.80	0.60	0.400	-
USER-DEFINED	-	0.10	0.60	0.600	-
USER-DEFINED	-	6.10	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.402

SUBAREA AREA (ACRES) = 9.00 SUBAREA RUNOFF (CFS) = 4.77

EFFECTIVE AREA (ACRES) = 19.40 AREA-AVERAGED Fm (INCH/HR) = 0.24

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.39

TOTAL AREA (ACRES) = 19.4 PEAK FLOW RATE (CFS) = 10.37

FLOW PROCESS FROM NODE 329.00 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) = 595.00 DOWNSTREAM (FEET) = 575.00

FLOW LENGTH (FEET) = 378.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.5 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 12.65

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

PIPE-FLOW (CFS) = 10.37

PIPE TRAVEL TIME (MIN.) = 0.50 Tc (MIN.) = 15.89

LONGEST FLOWPATH FROM NODE 327.00 TO NODE 330.00 = 1498.00 FEET.

FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 15.89

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.819

C-24

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.90	0.60	0.850	-
USER-DEFINED	-	4.10	0.60	0.600	-
USER-DEFINED	-	2.50	0.60	0.400	-

USER-DEFINED - 0.60 0.60 0.100 -
USER-DEFINED - 10.20 0.60 0.600 -
USER-DEFINED - 0.90 0.60 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.561
SUBAREA AREA (ACRES) = 19.20 SUBAREA RUNOFF (CFS) = 8.33
EFFECTIVE AREA (ACRES) = 38.60 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
TOTAL AREA (ACRES) = 38.6 PEAK FLOW RATE (CFS) = 18.50

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) = 575.00 DOWNSTREAM (FEET) = 555.00
FLOW LENGTH (FEET) = 457.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 13.33
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 18.50
PIPE TRAVEL TIME (MIN.) = 0.57 Tc (MIN.) = 16.46
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 331.00 = 1955.00 FEET.

FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 16.46
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.805

C-25

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.10	0.60	0.850	-
USER-DEFINED	-	0.80	0.60	0.900	-
USER-DEFINED	-	10.50	0.60	0.600	-
USER-DEFINED	-	0.30	0.60	0.100	-
USER-DEFINED	-	0.50	0.60	0.900	-
USER-DEFINED	-	13.70	0.60	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.619
SUBAREA AREA (ACRES) = 26.90 SUBAREA RUNOFF (CFS) = 10.49
EFFECTIVE AREA (ACRES) = 65.50 AREA-AVERAGED Fm (INCH/HR) = 0.32
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.54
TOTAL AREA (ACRES) = 65.5 PEAK FLOW RATE (CFS) = 28.52

FLOW PROCESS FROM NODE 331.00 TO NODE 332.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 555.00 DOWNSTREAM (FEET) = 520.00
FLOW LENGTH (FEET) = 324.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 20.88

ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 28.52
PIPE TRAVEL TIME (MIN.) = 0.26 Tc (MIN.) = 16.72
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 332.00 = 2279.00 FEET.

FLOW PROCESS FROM NODE 332.00 TO NODE 332.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 16.72
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.799

C-26

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.100	-
USER-DEFINED	-	2.10	0.60	0.900	-
USER-DEFINED	-	3.70	0.60	0.100	-
USER-DEFINED	-	5.00	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.621
SUBAREA AREA (ACRES) = 10.90 SUBAREA RUNOFF (CFS) = 4.18
EFFECTIVE AREA (ACRES) = 76.40 AREA-AVERAGED Fm (INCH/HR) = 0.33
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.55
TOTAL AREA (ACRES) = 76.4 PEAK FLOW RATE (CFS) = 32.33

FLOW PROCESS FROM NODE 332.00 TO NODE 333.00 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) = 500.00
FLOW LENGTH (FEET) = 1740.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 9.39
ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 32.33
PIPE TRAVEL TIME (MIN.) = 3.09 Tc (MIN.) = 19.81
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 333.00 = 4019.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 19.81
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.724

C-27

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.20	0.60	0.100	-
USER-DEFINED	-	4.40	0.60	0.900	-
USER-DEFINED	-	3.90	0.60	0.100	-
USER-DEFINED	-	9.80	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.689
SUBAREA AREA (ACRES) = 19.30 SUBAREA RUNOFF (CFS) = 5.41

EFFECTIVE AREA(ACRES) = 95.70 AREA-AVERAGED Fm(INCH/HR) = 0.35
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 95.7 PEAK FLOW RATE(CFS) = 32.64

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 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.) = 19.81
RAINFALL INTENSITY(INCH/HR) = 0.72
AREA-AVERAGED Fm(INCH/HR) = 0.35
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.58
EFFECTIVE STREAM AREA(ACRES) = 95.70
TOTAL STREAM AREA(ACRES) = 95.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 32.64

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	24.35	22.83	0.669	0.60(0.28)	0.47	69.9	320.00
2	32.64	19.81	0.724	0.60(0.35)	0.58	95.7	327.00

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	56.80	19.81	0.724	0.60(0.32)	0.53	156.4	327.00
2	52.21	22.83	0.669	0.60(0.32)	0.53	165.6	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 56.80 Tc(MIN.) = 19.81
EFFECTIVE AREA(ACRES) = 156.35 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 165.6
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 334.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 500.00 DOWNSTREAM(FEET) = 468.00
FLOW LENGTH(FEET) = 819.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.65
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 56.80
PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 20.63
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 20.63
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.709
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.00	0.60	0.200	-
USER-DEFINED	-	2.30	0.60	0.100	-
USER-DEFINED	-	1.00	0.60	0.100	-
USER-DEFINED	-	0.40	0.60	0.850	-
USER-DEFINED	-	2.40	0.60	0.850	-
USER-DEFINED	-	3.50	0.60	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.310
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 6.40
EFFECTIVE AREA(ACRES) = 169.95 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 179.2 PEAK FLOW RATE(CFS) = 60.96

C-28

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 20.63
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.709
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.00	0.60	0.200	-
USER-DEFINED	-	1.60	0.60	0.400	-
USER-DEFINED	-	2.10	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA(ACRES) = 5.70 SUBAREA RUNOFF(CFS) = 2.62
EFFECTIVE AREA(ACRES) = 175.65 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 184.9 PEAK FLOW RATE(CFS) = 63.58

C-28

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 20.63
RAINFALL INTENSITY(INCH/HR) = 0.71
AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.51
EFFECTIVE STREAM AREA(ACRES) = 175.65
TOTAL STREAM AREA(ACRES) = 184.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 63.58

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FLOW PROCESS FROM NODE 350.00 TO NODE 351.00 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) = 495.00 DOWNSTREAM(FEET) = 492.00

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

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.730

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.028

SUBAREA Tc AND LOSS RATE DATA(AMC II):

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include Residential and 3-4 Dwellings/Acre.

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600

SUBAREA RUNOFF(CFS) = 1.50

TOTAL AREA(ACRES) = 2.50 PEAK FLOW RATE(CFS) = 1.50

FLOW PROCESS FROM NODE 351.00 TO NODE 352.00 IS CODE = 62

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

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

UPSTREAM ELEVATION(FEET) = 492.00 DOWNSTREAM ELEVATION(FEET) = 488.00
STREET LENGTH(FEET) = 456.00 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

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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) = 2.29

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.29
HALFSTREET FLOOD WIDTH(FEET) = 7.03
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.80
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.52

STREET FLOW TRAVEL TIME(MIN.) = 4.21 Tc(MIN.) = 14.94

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.842

SUBAREA LOSS RATE DATA(AMC II):

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include User-Defined and Subarea Average Pvious Loss Rate.

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 1.56
EFFECTIVE AREA(ACRES) = 6.10 AREA-AVERAGED Fm(INCH/HR) = 0.36
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 6.1 PEAK FLOW RATE(CFS) = 2.65

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.30 HALFSTREET FLOOD WIDTH(FEET) = 7.66
FLOW VELOCITY(FEET/SEC.) = 1.85 DEPTH*VELOCITY(FT*FT/SEC.) = 0.55
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 352.00 = 786.00 FEET.

FLOW PROCESS FROM NODE 352.00 TO NODE 353.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 488.00 DOWNSTREAM(FEET) = 485.00
FLOW LENGTH(FEET) = 883.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.21
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.65
PIPE TRAVEL TIME(MIN.) = 4.59 Tc(MIN.) = 19.53
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 353.00 = 1669.00 FEET.

FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.53
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.731
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN
USER-DEFINED, USER-DEFINED, USER-DEFINED, USER-DEFINED, USER-DEFINED, USER-DEFINED
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.471
SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 3.43
EFFECTIVE AREA(ACRES) = 14.60 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 5.47

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FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.53
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.731
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.30	0.60	0.400	-
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400					
SUBAREA AREA (ACRES) =		0.30	SUBAREA RUNOFF (CFS) =		0.13
EFFECTIVE AREA (ACRES) =		14.90	AREA-AVERAGED Fm (INCH/HR) =		0.31
AREA-AVERAGED Fp (INCH/HR) =		0.60	AREA-AVERAGED Ap =		0.52
TOTAL AREA (ACRES) =		14.9	PEAK FLOW RATE (CFS) =		5.60

FLOW PROCESS FROM NODE 353.00 TO NODE 334.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 485.00 DOWNSTREAM(FEET) = 468.00
FLOW LENGTH(FEET) = 1136.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.76
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.60
PIPE TRAVEL TIME(MIN.) = 2.80 Tc(MIN.) = 22.33
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 334.00 = 2805.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.33
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.678

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.90	0.60	0.100	-
USER-DEFINED	-	2.00	0.60	0.850	-
USER-DEFINED	-	1.40	0.60	0.200	-
USER-DEFINED	-	1.50	0.60	0.400	-
USER-DEFINED	-	0.50	0.60	0.100	-
USER-DEFINED	-	1.50	0.60	0.850	-
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512					
SUBAREA AREA (ACRES) =		7.80	SUBAREA RUNOFF (CFS) =		2.60
EFFECTIVE AREA (ACRES) =		22.70	AREA-AVERAGED Fm (INCH/HR) =		0.31
AREA-AVERAGED Fp (INCH/HR) =		0.60	AREA-AVERAGED Ap =		0.52
TOTAL AREA (ACRES) =		22.7	PEAK FLOW RATE (CFS) =		7.49

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.33
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.678

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.90	0.60	0.100	-
USER-DEFINED	-	2.00	0.60	0.850	-
USER-DEFINED	-	1.40	0.60	0.200	-
USER-DEFINED	-	1.50	0.60	0.400	-
USER-DEFINED	-	0.50	0.60	0.100	-
USER-DEFINED	-	1.50	0.60	0.850	-

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	3.10	0.60	0.200	-
USER-DEFINED	-	1.40	0.60	0.400	-
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262					
SUBAREA AREA (ACRES) =		4.50	SUBAREA RUNOFF (CFS) =		2.11
EFFECTIVE AREA (ACRES) =		27.20	AREA-AVERAGED Fm (INCH/HR) =		0.29
AREA-AVERAGED Fp (INCH/HR) =		0.60	AREA-AVERAGED Ap =		0.48
TOTAL AREA (ACRES) =		27.2	PEAK FLOW RATE (CFS) =		9.60

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.33
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.678

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.60	0.850	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	1.20	0.60	0.600	-
USER-DEFINED	-	2.70	0.60	0.850	-
USER-DEFINED	-	0.20	0.60	0.900	-
USER-DEFINED	-	7.30	0.60	0.600	-
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.674					
SUBAREA AREA (ACRES) =		12.00	SUBAREA RUNOFF (CFS) =		2.96
EFFECTIVE AREA (ACRES) =		39.20	AREA-AVERAGED Fm (INCH/HR) =		0.32
AREA-AVERAGED Fp (INCH/HR) =		0.60	AREA-AVERAGED Ap =		0.54
TOTAL AREA (ACRES) =		39.2	PEAK FLOW RATE (CFS) =		12.56

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.33
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.678

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.100	-
USER-DEFINED	-	0.60	0.60	0.850	-
USER-DEFINED	-	3.10	0.60	0.600	-
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.626					
SUBAREA AREA (ACRES) =		3.80	SUBAREA RUNOFF (CFS) =		1.03
EFFECTIVE AREA (ACRES) =		43.00	AREA-AVERAGED Fm (INCH/HR) =		0.33
AREA-AVERAGED Fp (INCH/HR) =		0.60	AREA-AVERAGED Ap =		0.54
TOTAL AREA (ACRES) =		43.0	PEAK FLOW RATE (CFS) =		13.59

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 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.) = 22.33
 RAINFALL INTENSITY(INCH/HR) = 0.68
 AREA-AVERAGED Fm(INCH/HR) = 0.33
 AREA-AVERAGED Fp(INCH/HR) = 0.60
 AREA-AVERAGED Ap = 0.54
 EFFECTIVE STREAM AREA(ACRES) = 43.00
 TOTAL STREAM AREA(ACRES) = 43.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.59

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	63.58	20.63	0.709	0.60(0.31)	0.51	175.7	327.00
1	58.07	23.66	0.654	0.60(0.31)	0.51	184.9	320.00
2	13.59	22.33	0.678	0.60(0.33)	0.54	43.0	350.00

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	77.18	20.63	0.709	0.60(0.31)	0.52	215.4	327.00
2	74.08	22.33	0.678	0.60(0.31)	0.52	223.8	350.00
3	70.74	23.66	0.654	0.60(0.31)	0.52	227.9	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 77.18 Tc(MIN.) = 20.63
 EFFECTIVE AREA(ACRES) = 215.38 AREA-AVERAGED Fm(INCH/HR) = 0.31
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 227.9
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

 FLOW PROCESS FROM NODE 334.00 TO NODE 335.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 468.00 DOWNSTREAM(FEET) = 422.00
 FLOW LENGTH(FEET) = 1086.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.58
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 77.18
 PIPE TRAVEL TIME(MIN.) = 0.97 Tc(MIN.) = 21.61
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 335.00 = 6152.00 FEET.

 FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 21.61
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.691

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.00	0.60	0.100	-
USER-DEFINED	-	4.20	0.60	0.100	-
USER-DEFINED	-	0.60	0.60	0.850	-
USER-DEFINED	-	10.80	0.60	0.850	-
USER-DEFINED	-	1.00	0.60	0.900	-
USER-DEFINED	-	3.90	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.631
 SUBAREA AREA(ACRES) = 23.50 SUBAREA RUNOFF(CFS) = 6.62
 EFFECTIVE AREA(ACRES) = 238.88 AREA-AVERAGED Fm(INCH/HR) = 0.32
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 251.4 PEAK FLOW RATE(CFS) = 80.45

 FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 21.61
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.691

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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
USER-DEFINED	-	0.10	0.60	0.600	-
USER-DEFINED	-	0.10	0.60	0.600	-
USER-DEFINED	-	0.10	0.60	0.500	-
USER-DEFINED	-	9.20	0.60	0.500	-
USER-DEFINED	-	0.70	0.60	0.400	-
USER-DEFINED	-	2.90	0.60	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.474
 SUBAREA AREA(ACRES) = 13.10 SUBAREA RUNOFF(CFS) = 4.80
 EFFECTIVE AREA(ACRES) = 251.98 AREA-AVERAGED Fm(INCH/HR) = 0.32
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 264.5 PEAK FLOW RATE(CFS) = 85.25

 FLOW PROCESS FROM NODE 335.00 TO NODE 336.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 422.00 DOWNSTREAM(FEET) = 380.00
 FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.92
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 85.25
 PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 22.23
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 336.00 = 6932.00 FEET.

 FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.23
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.680 **C-33**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 0.70 0.60 0.100 -
 USER-DEFINED - 0.60 0.60 0.100 -
 USER-DEFINED - 1.60 0.60 0.100 -
 USER-DEFINED - 0.10 0.60 0.850 -
 USER-DEFINED - 3.70 0.60 0.200 -
 USER-DEFINED - 5.60 0.60 0.200 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.182
 SUBAREA AREA(ACRES) = 12.30 SUBAREA RUNOFF(CFS) = 6.32
 EFFECTIVE AREA(ACRES) = 264.28 AREA-AVERAGED Fm(INCH/HR) = 0.31
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 276.8 PEAK FLOW RATE(CFS) = 89.03

 FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 22.23
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.680 **C-33**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 0.20 0.60 0.900 -
 USER-DEFINED - 0.50 0.60 0.900 -
 USER-DEFINED - 0.60 0.60 0.900 -
 USER-DEFINED - 3.40 0.60 0.600 -
 USER-DEFINED - 16.80 0.60 0.600 -
 USER-DEFINED - 0.70 0.60 0.400 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.611
 SUBAREA AREA(ACRES) = 22.20 SUBAREA RUNOFF(CFS) = 6.26
 EFFECTIVE AREA(ACRES) = 286.48 AREA-AVERAGED Fm(INCH/HR) = 0.31
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 299.0 PEAK FLOW RATE(CFS) = 95.29

 FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 22.23
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.680 **C-33**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 6.30 0.60 0.400 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
 SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 2.49
 EFFECTIVE AREA(ACRES) = 292.78 AREA-AVERAGED Fm(INCH/HR) = 0.31
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.51

TOTAL AREA(ACRES) = 305.3 PEAK FLOW RATE(CFS) = 97.78

 FLOW PROCESS FROM NODE 336.00 TO NODE 337.00 IS CODE = 31
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 380.00 DOWNSTREAM(FEET) = 350.00
 FLOW LENGTH(FEET) = 803.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.22
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 97.78
 PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 22.92
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 337.00 = 7735.00 FEET.

 FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 22.92
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.667 **C-36**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 0.40 0.60 0.200 -
 USER-DEFINED - 3.00 0.60 0.200 -
 USER-DEFINED - 1.30 0.60 0.100 -
 USER-DEFINED - 2.70 0.60 0.100 -
 USER-DEFINED - 6.00 0.60 0.100 -
 USER-DEFINED - 1.30 0.60 0.850 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.189
 SUBAREA AREA(ACRES) = 14.70 SUBAREA RUNOFF(CFS) = 7.33
 EFFECTIVE AREA(ACRES) = 307.48 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 320.0 PEAK FLOW RATE(CFS) = 101.81

 FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 22.92
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.667 **C-36**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 3.30 0.60 0.850 -
 USER-DEFINED - 1.50 0.60 0.850 -
 USER-DEFINED - 2.50 0.60 0.200 -
 USER-DEFINED - 6.70 0.60 0.200 -
 USER-DEFINED - 2.20 0.60 0.900 -
 USER-DEFINED - 0.10 0.60 0.600 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.488

SUBAREA AREA (ACRES) = 16.30 SUBAREA RUNOFF (CFS) = 5.49
EFFECTIVE AREA (ACRES) = 323.78 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 336.3 PEAK FLOW RATE (CFS) = 107.30

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 22.92
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.667
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.60 0.60 0.600 -
USER-DEFINED - 4.60 0.60 0.400 -
USER-DEFINED - 2.90 0.60 0.400 -
USER-DEFINED - 0.20 0.60 0.600 -
USER-DEFINED - 5.90 0.60 0.600 -
USER-DEFINED - 6.00 0.60 0.600 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.526
SUBAREA AREA (ACRES) = 20.20 SUBAREA RUNOFF (CFS) = 6.40
EFFECTIVE AREA (ACRES) = 343.98 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 356.5 PEAK FLOW RATE (CFS) = 113.70

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FLOW PROCESS FROM NODE 337.00 TO NODE 338.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 350.00 DOWNSTREAM (FEET) = 332.00
FLOW LENGTH (FEET) = 838.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 15.78
ESTIMATED PIPE DIAMETER (INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 113.70
PIPE TRAVEL TIME (MIN.) = 0.89 Tc (MIN.) = 23.81
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 338.00 = 8573.00 FEET.

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.81
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.651
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 6.90 0.60 0.200 -
USER-DEFINED - 1.40 0.60 0.100 -
USER-DEFINED - 1.90 0.60 0.100 -
USER-DEFINED - 5.90 0.60 0.100 -
USER-DEFINED - 3.60 0.60 0.200 -

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USER-DEFINED - 0.10 0.60 0.200 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.154
SUBAREA AREA (ACRES) = 19.80 SUBAREA RUNOFF (CFS) = 9.97
EFFECTIVE AREA (ACRES) = 363.78 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
TOTAL AREA (ACRES) = 376.3 PEAK FLOW RATE (CFS) = 118.73

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.81
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.651
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.60 0.60 0.200 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA (ACRES) = 1.60 SUBAREA RUNOFF (CFS) = 0.77
EFFECTIVE AREA (ACRES) = 365.38 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
TOTAL AREA (ACRES) = 377.9 PEAK FLOW RATE (CFS) = 119.50

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.81
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.651
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.10 0.60 0.100 -
USER-DEFINED - 8.50 0.60 0.100 -
USER-DEFINED - 1.90 0.60 0.100 -
USER-DEFINED - 0.70 0.60 0.100 -
USER-DEFINED - 2.60 0.60 0.850 -
USER-DEFINED - 0.60 0.60 0.850 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.246
SUBAREA AREA (ACRES) = 16.40 SUBAREA RUNOFF (CFS) = 7.43
EFFECTIVE AREA (ACRES) = 381.78 AREA-AVERAGED Fm (INCH/HR) = 0.28
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.47
TOTAL AREA (ACRES) = 394.3 PEAK FLOW RATE (CFS) = 126.93

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.81
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.651
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

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LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	0.20	0.60	0.200	-
USER-DEFINED	-	6.20	0.60	0.100	-
USER-DEFINED	-	1.00	0.60	0.200	-
USER-DEFINED	-	1.70	0.60	0.200	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.132
SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 4.69
EFFECTIVE AREA (ACRES) = 390.88 AREA-AVERAGED Fm (INCH/HR) = 0.28
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 403.4 PEAK FLOW RATE (CFS) = 131.62

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.81
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.651
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.70	0.60	0.100	-
USER-DEFINED	-	1.70	0.60	0.100	-
USER-DEFINED	-	0.80	0.60	0.100	-
USER-DEFINED	-	2.00	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.850	-
USER-DEFINED	-	0.10	0.60	0.200	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.116
SUBAREA AREA (ACRES) = 5.40 SUBAREA RUNOFF (CFS) = 2.83
EFFECTIVE AREA (ACRES) = 396.28 AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 408.8 PEAK FLOW RATE (CFS) = 134.45

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.81
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.651
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.200	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA (ACRES) = 0.10 SUBAREA RUNOFF (CFS) = 0.05
EFFECTIVE AREA (ACRES) = 396.38 AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 408.9 PEAK FLOW RATE (CFS) = 134.49

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.81
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.651
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.30	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.100	-
USER-DEFINED	-	1.10	0.60	0.100	-
USER-DEFINED	-	0.20	0.60	0.600	-
USER-DEFINED	-	0.50	0.60	0.600	-
USER-DEFINED	-	1.20	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.316
SUBAREA AREA (ACRES) = 4.40 SUBAREA RUNOFF (CFS) = 1.83
EFFECTIVE AREA (ACRES) = 400.78 AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 413.3 PEAK FLOW RATE (CFS) = 136.32

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.81
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.651
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.40	0.60	0.100	-
USER-DEFINED	-	3.50	0.60	0.100	-
USER-DEFINED	-	4.70	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	0.200	-
USER-DEFINED	-	0.60	0.60	0.600	-
USER-DEFINED	-	0.60	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.145
SUBAREA AREA (ACRES) = 14.10 SUBAREA RUNOFF (CFS) = 7.17
EFFECTIVE AREA (ACRES) = 414.88 AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.45
TOTAL AREA (ACRES) = 427.4 PEAK FLOW RATE (CFS) = 143.49

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.81
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.651
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.30	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA (ACRES) = 3.30 SUBAREA RUNOFF (CFS) = 0.87
EFFECTIVE AREA (ACRES) = 418.18 AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.45
TOTAL AREA (ACRES) = 430.7 PEAK FLOW RATE (CFS) = 144.35

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FLOW PROCESS FROM NODE 338.00 TO NODE 339.00 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) = 332.00 DOWNSTREAM(FEET) = 301.00
FLOW LENGTH(FEET) = 1956.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.91
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 144.35
PIPE TRAVEL TIME(MIN.) = 2.19 Tc(MIN.) = 26.00
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 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
1 144.35 26.00 0.616 0.60(0.27) 0.45 418.2 327.00
2 135.89 27.73 0.592 0.60(0.27) 0.45 426.6 350.00
3 129.82 29.09 0.573 0.60(0.27) 0.45 430.7 320.00
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 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 83.42 20.12 0.718 0.60(0.23) 0.38 179.1 300.00
2 58.64 33.31 0.534 0.60(0.23) 0.39 195.4 306.00
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 227.78 20.12 0.718 0.60(0.25) 0.42 502.7 300.00
2 216.73 26.00 0.616 0.60(0.26) 0.43 604.5 327.00
3 205.01 27.73 0.592 0.60(0.26) 0.43 615.1 350.00
4 196.39 29.09 0.573 0.60(0.26) 0.43 620.9 320.00
5 179.58 33.31 0.534 0.60(0.26) 0.43 626.1 306.00
TOTAL AREA(ACRES) = 626.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 227.78 Tc(MIN.) = 20.121
EFFECTIVE AREA(ACRES) = 502.73 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 626.1
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

FLOW PROCESS FROM NODE 339.00 TO NODE 340.00 IS CODE = 56

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

>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM(FEET) = 301.00 DOWNSTREAM(FEET) = 300.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 196.00 CHANNEL SLOPE = 0.0051
GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0

"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030

*ESTIMATED CHANNEL HEIGHT(FEET) = 1.41

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.688

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SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 31.90 0.60 0.100 -
USER-DEFINED - 2.30 0.60 0.100 -
USER-DEFINED - 1.90 0.60 0.100 -
USER-DEFINED - 1.00 0.60 0.100 -
USER-DEFINED - 3.10 0.60 0.850 -
USER-DEFINED - 0.80 0.60 0.850 -

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.171

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 238.56

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.94

AVERAGE FLOW DEPTH(FEET) = 0.41 TRAVEL TIME(MIN.) = 1.68

Tc(MIN.) = 21.80

SUBAREA AREA(ACRES) = 41.00 SUBAREA RUNOFF(CFS) = 21.58

EFFECTIVE AREA(ACRES) = 543.73 AREA-AVERAGED Fm(INCH/HR) = 0.24

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.40

TOTAL AREA(ACRES) = 667.1 PEAK FLOW RATE(CFS) = 227.78

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0

"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030

*ESTIMATED CHANNEL HEIGHT(FEET) = 1.40

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.40 FLOW VELOCITY(FEET/SEC.) = 1.89

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 340.00 = 10725.00 FEET.

FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 21.80

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.688

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SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 4.00 0.60 0.900 -
USER-DEFINED - 1.80 0.60 0.900 -
USER-DEFINED - 2.40 0.60 0.900 -
USER-DEFINED - 0.10 0.60 0.850 -
USER-DEFINED - 0.10 0.60 0.850 -

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.899

SUBAREA AREA(ACRES) = 8.40 SUBAREA RUNOFF(CFS) = 1.12

EFFECTIVE AREA(ACRES) = 552.13 AREA-AVERAGED Fm(INCH/HR) = 0.25

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.41

TOTAL AREA(ACRES) = 675.5 PEAK FLOW RATE(CFS) = 227.78

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 340.00 TO NODE 374.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 300.00 DOWNSTREAM(FEET) = 298.00
FLOW LENGTH(FEET) = 221.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.64
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 227.78
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 22.07
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 374.00 = 10946.00 FEET.

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 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
1 227.78 22.07 0.683 0.60(0.25) 0.41 552.1 300.00
2 216.73 27.98 0.588 0.60(0.25) 0.42 653.9 327.00
3 205.01 29.78 0.563 0.60(0.25) 0.42 664.5 350.00
4 196.39 31.15 0.551 0.60(0.25) 0.42 670.3 320.00
5 183.28 35.45 0.516 0.60(0.25) 0.42 675.5 306.00
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 374.00 = 10946.00 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 13.11 70.60 0.343 0.60(0.47) 0.79 195.1 390.00
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 239.66 22.07 0.683 0.60(0.27) 0.45 613.1 300.00
2 225.65 27.98 0.588 0.60(0.27) 0.46 731.3 327.00
3 214.09 29.78 0.563 0.60(0.28) 0.46 746.8 350.00
4 205.68 31.15 0.551 0.60(0.28) 0.46 756.4 320.00
5 193.20 35.45 0.516 0.60(0.28) 0.47 773.5 306.00
6 134.72 70.60 0.343 0.60(0.30) 0.50 870.6 390.00
TOTAL AREA(ACRES) = 870.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 239.66 Tc(MIN.) = 22.070
EFFECTIVE AREA(ACRES) = 613.12 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 870.6
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 12

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

FLOW PROCESS FROM NODE 374.00 TO NODE 380.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 298.00 DOWNSTREAM(FEET) = 261.00
FLOW LENGTH(FEET) = 1402.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.81
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 239.66
PIPE TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 23.19
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 380.00 = 15238.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 870.6 TC(MIN.) = 23.19
EFFECTIVE AREA(ACRES) = 613.12 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.448
PEAK FLOW RATE(CFS) = 239.66

** PEAK FLOW RATE TABLE **

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 239.66 23.19 0.663 0.60(0.27) 0.45 613.1 300.00
2 225.65 29.12 0.572 0.60(0.27) 0.46 731.3 327.00
3 214.09 30.94 0.552 0.60(0.28) 0.46 746.8 350.00
4 205.68 32.32 0.541 0.60(0.28) 0.46 756.4 320.00
5 193.20 36.62 0.507 0.60(0.28) 0.47 773.5 306.00
6 134.72 71.89 0.340 0.60(0.30) 0.50 870.6 390.00

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 1264

Analysis prepared by:

Michael Baker International
5 Hutton Centre Drive Suite 500
Santa Ana, CA92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA C ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 5-YR EV DECEMBER 2018 CCHIUI *

FILE NAME: PA3C05EV.DAT
TIME/DATE OF STUDY: 11:26 12/13/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 5.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 2.180
- 2) 10.00; 1.510
- 3) 15.00; 1.200
- 4) 20.00; 1.020
- 5) 25.00; 0.900
- 6) 30.00; 0.830
- 7) 40.00; 0.690
- 8) 50.00; 0.610
- 9) 60.00; 0.550
- 10) 90.00; 0.440
- 11) 120.00; 0.370
- 12) 180.00; 0.310
- 13) 360.00; 0.210
- 14) 1200.00; 0.090

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 (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

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) = 320.00
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.) = 6.766
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.943

C-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.)
COMMERCIAL	-	0.20	0.50	0.100	56	6.77
PUBLIC PARK	-	0.90	0.50	0.850	56	10.75
COMMERCIAL	-	0.30	0.50	0.100	56	6.77
PUBLIC PARK	-	1.90	0.50	0.850	56	10.75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.736

SUBAREA RUNOFF(CFS) = 4.68

TOTAL AREA(ACRES) = 3.30 PEAK FLOW RATE(CFS) = 4.68

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) = 634.00 DOWNSTREAM ELEVATION(FEET) = 630.00
STREET LENGTH(FEET) = 503.00 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

C-3

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) = 9.97

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.42

HALFSTREET FLOOD WIDTH(FEET) = 14.65

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.36

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.00

STREET FLOW TRAVEL TIME(MIN.) = 3.55 Tc(MIN.) = 10.31

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.940

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.50	0.100	-
USER-DEFINED	-	2.10	0.50	0.850	-
USER-DEFINED	-	4.60	0.50	0.600	-
USER-DEFINED	-	0.30	0.50	0.100	-
USER-DEFINED	-	1.40	0.50	0.850	-
USER-DEFINED	-	1.10	0.50	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.648
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 10.50
EFFECTIVE AREA(ACRES) = 13.30 AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) = 13.3 PEAK FLOW RATE(CFS) = 13.83

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 16.76
FLOW VELOCITY(FEET/SEC.) = 2.56 DEPTH*VELOCITY(FT*FT/SEC.) = 1.18
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 823.00 FEET.

FLOW PROCESS FROM NODE 302.00 TO NODE 302.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.31
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.490 C-2
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.00	0.50	0.850	-
USER-DEFINED	-	9.30	0.50	0.200	-
USER-DEFINED	-	0.40	0.50	0.850	-
USER-DEFINED	-	1.30	0.50	0.200	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.276
SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 14.61
EFFECTIVE AREA(ACRES) = 25.30 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 25.3 PEAK FLOW RATE(CFS) = 28.44

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) = 630.00 DOWNSTREAM(FEET) = 625.00
FLOW LENGTH(FEET) = 651.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.77
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 28.44
PIPE TRAVEL TIME(MIN.) = 1.40 Tc(MIN.) = 11.71
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1474.00 FEET.

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 11.71
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.404 C-5
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.40	0.50	0.100	-
USER-DEFINED	-	0.40	0.50	0.850	-
USER-DEFINED	-	1.80	0.50	0.400	-
USER-DEFINED	-	1.30	0.50	0.600	-
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	0.60	0.50	0.850	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.480
SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 5.34
EFFECTIVE AREA(ACRES) = 30.40 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 30.4 PEAK FLOW RATE(CFS) = 31.81

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 11.71
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.404 C-5
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.50	0.50	0.400	-
USER-DEFINED	-	5.20	0.50	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.520
SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 8.96
EFFECTIVE AREA(ACRES) = 39.10 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 39.1 PEAK FLOW RATE(CFS) = 40.77

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 11.71
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.404 C-4
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.80	0.50	0.100	-
USER-DEFINED	-	0.40	0.50	0.850	-
USER-DEFINED	-	7.40	0.50	0.200	-
USER-DEFINED	-	0.30	0.50	0.850	-
USER-DEFINED	-	0.50	0.50	0.200	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.215

SUBAREA AREA (ACRES) = 11.40 SUBAREA RUNOFF (CFS) = 13.30
EFFECTIVE AREA (ACRES) = 50.50 AREA-AVERAGED Fm (INCH/HR) = 0.21
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.43
TOTAL AREA (ACRES) = 50.5 PEAK FLOW RATE (CFS) = 54.07

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 11.71
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.404 **C-6**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 4.70 0.50 0.100 -
USER-DEFINED - 2.30 0.50 0.850 -
USER-DEFINED - 4.90 0.50 0.200 -
USER-DEFINED - 1.70 0.50 0.100 -
USER-DEFINED - 1.80 0.50 0.850 -
USER-DEFINED - 6.20 0.50 0.200 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.294
SUBAREA AREA (ACRES) = 21.60 SUBAREA RUNOFF (CFS) = 24.44
EFFECTIVE AREA (ACRES) = 72.10 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.39
TOTAL AREA (ACRES) = 72.1 PEAK FLOW RATE (CFS) = 78.51

FLOW PROCESS FROM NODE 303.00 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) = 625.00 DOWNSTREAM (FEET) = 615.00
FLOW LENGTH (FEET) = 1029.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.3 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 10.94
ESTIMATED PIPE DIAMETER (INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 78.51
PIPE TRAVEL TIME (MIN.) = 1.57 Tc (MIN.) = 13.28
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 305.00 = 2503.00 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 13.28
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.307 **C-7**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.10 0.50 0.100 -
USER-DEFINED - 1.80 0.50 0.850 -
USER-DEFINED - 1.00 0.50 0.200 -
USER-DEFINED - 5.00 0.50 0.400 -
USER-DEFINED - 2.80 0.50 0.100 -

USER-DEFINED - 0.90 0.50 0.850 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.367
SUBAREA AREA (ACRES) = 13.60 SUBAREA RUNOFF (CFS) = 13.75
EFFECTIVE AREA (ACRES) = 85.70 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.38
TOTAL AREA (ACRES) = 85.7 PEAK FLOW RATE (CFS) = 85.95

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 13.28
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.307 **C-7**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.80 0.50 0.200 -
USER-DEFINED - 1.20 0.50 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.280
SUBAREA AREA (ACRES) = 3.00 SUBAREA RUNOFF (CFS) = 3.15
EFFECTIVE AREA (ACRES) = 88.70 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.38
TOTAL AREA (ACRES) = 88.7 PEAK FLOW RATE (CFS) = 89.10

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 13.28
RAINFALL INTENSITY (INCH/HR) = 1.31
AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.38
EFFECTIVE STREAM AREA (ACRES) = 88.70
TOTAL STREAM AREA (ACRES) = 88.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 89.10

FLOW PROCESS FROM NODE 306.00 TO NODE 307.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH (FEET) = 317.00
ELEVATION DATA: UPSTREAM (FEET) = 646.00 DOWNSTREAM (FEET) = 645.00 **C-8**
Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 15.296
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.189
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.)

```

PUBLIC PARK - 0.40 0.50 0.850 56 15.30
RESIDENTIAL
".4 DWELLING/ACRE" - 0.10 0.50 0.900 56 15.42
PUBLIC PARK - 1.50 0.50 0.850 56 15.30
RESIDENTIAL
".4 DWELLING/ACRE" - 0.20 0.50 0.900 56 15.42
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.857
SUBAREA RUNOFF (CFS) = 1.51
TOTAL AREA (ACRES) = 2.20 PEAK FLOW RATE (CFS) = 1.51

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*****
FLOW PROCESS FROM NODE 307.00 TO NODE 307.10 IS CODE = 62
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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
UPSTREAM ELEVATION (FEET) = 645.00 DOWNSTREAM ELEVATION (FEET) = 641.00
STREET LENGTH (FEET) = 375.00 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

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C-8.1

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SPECIFIED NUMBER OF HALFSSTREETS 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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 2.93
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.30
HALFSTREET FLOOD WIDTH (FEET) = 7.66
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.05
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 0.61
STREET FLOW TRAVEL TIME (MIN.) = 3.06 Tc (MIN.) = 18.35
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.079

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SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.40 0.50 0.850 -
USER-DEFINED - 2.00 0.50 0.600 -
USER-DEFINED - 0.30 0.50 0.850 -
USER-DEFINED - 0.10 0.50 0.900 -
USER-DEFINED - 1.40 0.50 0.600 -

```

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.649
SUBAREA AREA (ACRES) = 4.20 SUBAREA RUNOFF (CFS) = 2.85
EFFECTIVE AREA (ACRES) = 6.40 AREA-AVERAGED Fm (INCH/HR) = 0.36
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.72
TOTAL AREA (ACRES) = 6.4 PEAK FLOW RATE (CFS) = 4.14

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.33 HALFSTREET FLOOD WIDTH (FEET) = 9.16
FLOW VELOCITY (FEET/SEC.) = 2.20 DEPTH*VELOCITY (FT*FT/SEC.) = 0.72
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 307.10 = 692.00 FEET.

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*****
FLOW PROCESS FROM NODE 307.10 TO NODE 308.00 IS CODE = 62
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>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
UPSTREAM ELEVATION (FEET) = 641.00 DOWNSTREAM ELEVATION (FEET) = 635.00
STREET LENGTH (FEET) = 506.00 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

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C-9

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SPECIFIED NUMBER OF HALFSSTREETS 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

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**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 6.83
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.37
HALFSTREET FLOOD WIDTH (FEET) = 11.37
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.53
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 0.93
STREET FLOW TRAVEL TIME (MIN.) = 3.33 Tc (MIN.) = 21.68
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 0.980

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SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.00 0.50 0.100 -
USER-DEFINED - 0.30 0.50 0.850 -
USER-DEFINED - 4.80 0.50 0.600 -
USER-DEFINED - 0.10 0.50 0.900 -
USER-DEFINED - 2.30 0.50 0.600 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.554
SUBAREA AREA (ACRES) = 8.50 SUBAREA RUNOFF (CFS) = 5.38
EFFECTIVE AREA (ACRES) = 14.90 AREA-AVERAGED Fm (INCH/HR) = 0.31
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.63
TOTAL AREA (ACRES) = 14.9 PEAK FLOW RATE (CFS) = 8.94

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.39 HALFSTREET FLOOD WIDTH (FEET) = 12.77
FLOW VELOCITY (FEET/SEC.) = 2.71 DEPTH*VELOCITY (FT*FT/SEC.) = 1.06
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 308.00 = 1198.00 FEET.

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*****
FLOW PROCESS FROM NODE 308.00 TO NODE 305.00 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) = 635.00 DOWNSTREAM (FEET) = 615.00
FLOW LENGTH (FEET) = 1516.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 7.17
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1

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PIPE-FLOW(CFS) = 8.94
 PIPE TRAVEL TIME(MIN.) = 3.53 Tc(MIN.) = 25.21
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 25.21
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.897 **C-10**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.20	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.850	-
USER-DEFINED	-	2.20	0.50	0.200	-
USER-DEFINED	-	0.80	0.50	0.600	-
USER-DEFINED	-	0.50	0.50	0.400	-
USER-DEFINED	-	0.20	0.50	0.600	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.289
 SUBAREA AREA(ACRES) = 5.00 SUBAREA RUNOFF(CFS) = 3.39
 EFFECTIVE AREA(ACRES) = 19.90 AREA-AVERAGED Fm(INCH/HR) = 0.27
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 19.9 PEAK FLOW RATE(CFS) = 11.22

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 25.21
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.897 **C-10**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.20	0.50	0.100	-
USER-DEFINED	-	0.20	0.50	0.850	-
USER-DEFINED	-	2.30	0.50	0.200	-
USER-DEFINED	-	0.30	0.50	0.900	-
USER-DEFINED	-	4.00	0.50	0.600	-
USER-DEFINED	-	6.60	0.50	0.400	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.415
 SUBAREA AREA(ACRES) = 14.60 SUBAREA RUNOFF(CFS) = 9.06
 EFFECTIVE AREA(ACRES) = 34.50 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 34.5 PEAK FLOW RATE(CFS) = 20.28

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 25.21
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.897 **C-10**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.50	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.11
 EFFECTIVE AREA(ACRES) = 34.70 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 34.7 PEAK FLOW RATE(CFS) = 20.39

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 25.21
 RAINFALL INTENSITY(INCH/HR) = 0.90
 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50
 AREA-AVERAGED Ap = 0.49
 EFFECTIVE STREAM AREA(ACRES) = 34.70
 TOTAL STREAM AREA(ACRES) = 34.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 20.39

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	89.10	13.28	1.307	0.50(0.19)	0.38	88.7	300.00
2	20.39	25.21	0.897	0.50(0.24)	0.49	34.7	306.00

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	106.58	13.28	1.307	0.50(0.20)	0.40	107.0	300.00
2	76.79	25.21	0.897	0.50(0.21)	0.41	123.4	306.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 106.58 Tc(MIN.) = 13.28
 EFFECTIVE AREA(ACRES) = 106.98 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.40
 TOTAL AREA(ACRES) = 123.4
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 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) = 480.00
 FLOW LENGTH(FEET) = 2954.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.9 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 20.59
ESTIMATED PIPE DIAMETER (INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 106.58
PIPE TRAVEL TIME (MIN.) = 2.39 Tc (MIN.) = 15.67
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 310.00 = 5668.00 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 15.67
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.176
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 4.80 0.50 0.100 -
USER-DEFINED - 0.40 0.50 0.900 -
USER-DEFINED - 0.20 0.50 0.600 -
USER-DEFINED - 2.30 0.50 0.100 -
USER-DEFINED - 0.10 0.50 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.164
SUBAREA AREA (ACRES) = 7.80 SUBAREA RUNOFF (CFS) = 7.68
EFFECTIVE AREA (ACRES) = 114.78 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.38
TOTAL AREA (ACRES) = 131.2 PEAK FLOW RATE (CFS) = 106.58
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 15.67
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.176
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.10 0.50 0.100 -
USER-DEFINED - 0.20 0.50 0.850 -
USER-DEFINED - 2.30 0.50 0.850 -
USER-DEFINED - 6.40 0.50 0.200 -
USER-DEFINED - 2.60 0.50 0.200 -
USER-DEFINED - 0.70 0.50 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.371
SUBAREA AREA (ACRES) = 12.30 SUBAREA RUNOFF (CFS) = 10.96
EFFECTIVE AREA (ACRES) = 127.08 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.38
TOTAL AREA (ACRES) = 143.5 PEAK FLOW RATE (CFS) = 112.62

C-12

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 15.67

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.176

C-12

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.20 0.50 0.900 -
USER-DEFINED - 0.10 0.50 0.600 -
USER-DEFINED - 0.80 0.50 0.500 -
USER-DEFINED - 10.20 0.50 0.500 -
USER-DEFINED - 2.50 0.50 0.400 -
USER-DEFINED - 3.70 0.50 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.514
SUBAREA AREA (ACRES) = 19.50 SUBAREA RUNOFF (CFS) = 16.13
EFFECTIVE AREA (ACRES) = 146.58 AREA-AVERAGED Fm (INCH/HR) = 0.20
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.40
TOTAL AREA (ACRES) = 163.0 PEAK FLOW RATE (CFS) = 128.75

FLOW PROCESS FROM NODE 310.00 TO NODE 311.00 IS CODE = 31

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

>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM (FEET) = 480.00 DOWNSTREAM (FEET) = 430.00
FLOW LENGTH (FEET) = 1056.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 22.14
ESTIMATED PIPE DIAMETER (INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 128.75
PIPE TRAVEL TIME (MIN.) = 0.80 Tc (MIN.) = 16.46
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 311.00 = 6724.00 FEET.

FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 16.46
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.147
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.60 0.50 0.100 -
USER-DEFINED - 3.60 0.50 0.100 -
USER-DEFINED - 0.10 0.50 0.850 -
USER-DEFINED - 3.90 0.50 0.200 -
USER-DEFINED - 5.10 0.50 0.200 -
USER-DEFINED - 0.80 0.50 0.600 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.191
SUBAREA AREA (ACRES) = 15.10 SUBAREA RUNOFF (CFS) = 14.29
EFFECTIVE AREA (ACRES) = 161.68 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.38
TOTAL AREA (ACRES) = 178.1 PEAK FLOW RATE (CFS) = 139.27

C-13

FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.46
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.147
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	6.70	0.50	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 5.11
 EFFECTIVE AREA(ACRES) = 168.38 AREA-AVERAGED Fm(INCH/HR) = 0.19
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 184.8 PEAK FLOW RATE(CFS) = 144.38

C-13

 FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 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) = 373.00
 FLOW LENGTH(FEET) = 1373.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 21.79
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 144.38
 PIPE TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 17.51
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 312.00 = 8097.00 FEET.

 FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.51
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.109
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.50	0.50	0.100	-
USER-DEFINED	-	4.50	0.50	0.100	-
USER-DEFINED	-	3.40	0.50	0.200	-
USER-DEFINED	-	0.30	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.850	-
USER-DEFINED	-	0.20	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.157
 SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 9.28
 EFFECTIVE AREA(ACRES) = 178.38 AREA-AVERAGED Fm(INCH/HR) = 0.19
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.38
 TOTAL AREA(ACRES) = 194.8 PEAK FLOW RATE(CFS) = 147.92

C-42

 FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.51
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.109
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	0.40	0.50	0.500	-
USER-DEFINED	-	0.10	0.50	0.500	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.567
 SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 0.45
 EFFECTIVE AREA(ACRES) = 178.98 AREA-AVERAGED Fm(INCH/HR) = 0.19
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.38
 TOTAL AREA(ACRES) = 195.4 PEAK FLOW RATE(CFS) = 148.37

C-42

 FLOW PROCESS FROM NODE 312.00 TO NODE 339.00 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) = 301.00
 FLOW LENGTH(FEET) = 1370.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 24.19
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 148.37
 PIPE TRAVEL TIME(MIN.) = 0.94 Tc(MIN.) = 18.46
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

 FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<

 FLOW PROCESS FROM NODE 390.00 TO NODE 391.00 IS CODE = 21

>>>>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

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.195
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.618
 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						

OC-1

"CHAPARRAL,NARROWLEAF" - 0.20 0.50 1.000 56 9.20
 NATURAL FAIR COVER
 "OPEN BRUSH" - 1.20 0.50 1.000 56 9.20
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 1.41
 TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 1.41

 FLOW PROCESS FROM NODE 391.00 TO NODE 392.00 IS CODE = 51

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

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
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.438

OC-2

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.70	0.50	1.000	-
USER-DEFINED	-	0.60	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.38
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.61
 AVERAGE FLOW DEPTH(FEET) = 0.41 TRAVEL TIME(MIN.) = 1.97
 Tc(MIN.) = 11.16
 SUBAREA AREA(ACRES) = 2.30 SUBAREA RUNOFF(CFS) = 1.94
 EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.50
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 3.12

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45 FLOW VELOCITY(FEET/SEC.) = 5.03
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 392.00 = 862.00 FEET.

 FLOW PROCESS FROM NODE 392.00 TO NODE 393.00 IS CODE = 51

>>>>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
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.208

OC-3

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.40	0.50	1.000	-
USER-DEFINED	-	8.40	0.50	1.000	-
USER-DEFINED	-	2.70	0.50	1.000	-
USER-DEFINED	-	0.40	0.50	1.000	-
USER-DEFINED	-	9.20	0.50	1.000	-

USER-DEFINED - 0.60 0.50 1.000 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.47
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.92
 AVERAGE FLOW DEPTH(FEET) = 0.84 TRAVEL TIME(MIN.) = 3.70
 Tc(MIN.) = 14.87
 SUBAREA AREA(ACRES) = 22.70 SUBAREA RUNOFF(CFS) = 14.47
 EFFECTIVE AREA(ACRES) = 26.40 AREA-AVERAGED Fm(INCH/HR) = 0.50
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 26.4 PEAK FLOW RATE(CFS) = 16.82

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.00 FLOW VELOCITY(FEET/SEC.) = 5.56
 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
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.098

OC-4

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.60	0.50	1.000	-
USER-DEFINED	-	5.50	0.50	1.000	-
USER-DEFINED	-	1.80	0.50	1.000	-
USER-DEFINED	-	0.60	0.50	1.000	-
USER-DEFINED	-	1.00	0.50	1.000	-
USER-DEFINED	-	6.80	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.49
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.10
 AVERAGE FLOW DEPTH(FEET) = 1.19 TRAVEL TIME(MIN.) = 2.96
 Tc(MIN.) = 17.82
 SUBAREA AREA(ACRES) = 17.30 SUBAREA RUNOFF(CFS) = 9.31
 EFFECTIVE AREA(ACRES) = 43.70 AREA-AVERAGED Fm(INCH/HR) = 0.50
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 43.7 PEAK FLOW RATE(CFS) = 23.53

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.22 FLOW VELOCITY(FEET/SEC.) = 5.24
 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.) = 17.82
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.098

OC-4

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.50	0.50	1.000	-
USER-DEFINED	-	0.10	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 1.40
EFFECTIVE AREA(ACRES) = 46.30 AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 46.3 PEAK FLOW RATE(CFS) = 24.93

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) = 664.00 CHANNEL SLOPE = 0.0377
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.024

OC-5

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	6.30	0.50	1.000	-
USER-DEFINED	-	5.90	0.50	1.000	-
USER-DEFINED	-	6.80	0.50	1.000	-
USER-DEFINED	-	0.90	0.50	0.900	-
USER-DEFINED	-	0.50	0.50	1.000	-
USER-DEFINED	-	0.20	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.996
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 29.81
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.37
AVERAGE FLOW DEPTH(FEET) = 1.36 TRAVEL TIME(MIN.) = 2.06
Tc(MIN.) = 19.88
SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 9.76
EFFECTIVE AREA(ACRES) = 66.90 AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 66.9 PEAK FLOW RATE(CFS) = 31.59

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.39 FLOW VELOCITY(FEET/SEC.) = 5.44
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 395.00 = 3523.00 FEET.

FLOW PROCESS FROM NODE 395.00 TO NODE 395.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.88
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.024

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	12.60	0.50	1.000	-

OC-5

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.10	0.50	1.000	-
USER-DEFINED	-	2.40	0.50	0.900	-
USER-DEFINED	-	0.10	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.987
SUBAREA AREA(ACRES) = 18.20 SUBAREA RUNOFF(CFS) = 8.69
EFFECTIVE AREA(ACRES) = 85.10 AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 85.1 PEAK FLOW RATE(CFS) = 40.28

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) = 389.00
FLOW LENGTH(FEET) = 5717.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.60
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.28
PIPE TRAVEL TIME(MIN.) = 6.53 Tc(MIN.) = 26.41
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 370.00 = 9240.00 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) = 389.00 DOWNSTREAM(FEET) = 345.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1996.00 CHANNEL SLOPE = 0.0220
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.784

C-50

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.90	0.50	1.000	-
USER-DEFINED	-	4.40	0.50	1.000	-
USER-DEFINED	-	0.50	0.50	0.100	-
USER-DEFINED	-	6.60	0.50	1.000	-
USER-DEFINED	-	3.60	0.50	1.000	-
USER-DEFINED	-	6.10	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.956
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 43.61
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.83
AVERAGE FLOW DEPTH(FEET) = 1.73 TRAVEL TIME(MIN.) = 6.89
Tc(MIN.) = 33.30
SUBAREA AREA(ACRES) = 24.10 SUBAREA RUNOFF(CFS) = 6.63
EFFECTIVE AREA(ACRES) = 109.20 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.99
TOTAL AREA(ACRES) = 109.2 PEAK FLOW RATE(CFS) = 40.28
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.68 FLOW VELOCITY(FEET/SEC.) = 4.75
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 371.00 = 11236.00 FEET.

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 33.30
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.784
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.10 0.50 1.000 -
USER-DEFINED - 1.10 0.50 0.100 -
USER-DEFINED - 2.00 0.50 1.000 -
USER-DEFINED - 0.40 0.50 1.000 -
USER-DEFINED - 2.20 0.50 0.900 -
USER-DEFINED - 0.30 0.50 1.000 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.830
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 2.36
EFFECTIVE AREA(ACRES) = 116.30 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.98
TOTAL AREA(ACRES) = 116.3 PEAK FLOW RATE(CFS) = 40.28
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.) = 33.30
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.784
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.70 0.50 0.900 -
USER-DEFINED - 0.20 0.50 1.000 -
USER-DEFINED - 0.10 0.50 0.850 -
USER-DEFINED - 0.10 0.50 0.500 -
USER-DEFINED - 3.00 0.50 1.000 -
USER-DEFINED - 1.40 0.50 1.000 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.975
SUBAREA AREA(ACRES) = 5.50 SUBAREA RUNOFF(CFS) = 1.46
EFFECTIVE AREA(ACRES) = 121.80 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.98
TOTAL AREA(ACRES) = 121.8 PEAK FLOW RATE(CFS) = 40.28
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

C-50

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 33.30
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.784

C-50

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.40 0.50 0.900 -
USER-DEFINED - 0.10 0.50 1.000 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.907
SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 0.45
EFFECTIVE AREA(ACRES) = 123.30 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.98
TOTAL AREA(ACRES) = 123.3 PEAK FLOW RATE(CFS) = 40.28
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 371.00 TO NODE 372.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 345.00 DOWNSTREAM(FEET) = 301.00
FLOW LENGTH(FEET) = 488.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.21
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.28
PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 33.68
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 372.00 = 11724.00 FEET.

FLOW PROCESS FROM NODE 372.00 TO NODE 373.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM(FEET) = 301.00 DOWNSTREAM(FEET) = 300.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 924.00 CHANNEL SLOPE = 0.0011
GIVEN CHANNEL BASE(FEET) = 30.00 CHANNEL FREEBOARD(FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
*ESTIMATED CHANNEL HEIGHT(FEET) = 1.99
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.661

C-60

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 32.30 0.50 0.100 -
USER-DEFINED - 2.70 0.50 0.100 -
USER-DEFINED - 0.60 0.50 0.100 -
USER-DEFINED - 1.80 0.50 0.100 -
USER-DEFINED - 7.20 0.50 0.850 -
USER-DEFINED - 9.80 0.50 0.850 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.334
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 52.32
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.55
AVERAGE FLOW DEPTH(FEET) = 1.02 TRAVEL TIME(MIN.) = 9.92
Tc(MIN.) = 43.60
SUBAREA AREA(ACRES) = 54.40 SUBAREA RUNOFF(CFS) = 24.18
EFFECTIVE AREA(ACRES) = 177.70 AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.78

TOTAL AREA (ACRES) = 177.7 PEAK FLOW RATE (CFS) = 43.35
GIVEN CHANNEL BASE (FEET) = 30.00 CHANNEL FREEBOARD (FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
*ESTIMATED CHANNEL HEIGHT (FEET) = 1.91

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.91 FLOW VELOCITY (FEET/SEC.) = 1.45
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 373.00 = 12648.00 FEET.

FLOW PROCESS FROM NODE 373.00 TO NODE 373.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 43.60
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 0.661
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.60 0.50 0.850 -
USER-DEFINED - 2.10 0.50 0.850 -
USER-DEFINED - 3.50 0.50 0.900 -
USER-DEFINED - 4.80 0.50 0.900 -
USER-DEFINED - 3.60 0.50 0.900 -
USER-DEFINED - 0.80 0.50 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.886
SUBAREA AREA (ACRES) = 17.40 SUBAREA RUNOFF (CFS) = 3.41
EFFECTIVE AREA (ACRES) = 195.10 AREA-AVERAGED Fm (INCH/HR) = 0.39
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.79
TOTAL AREA (ACRES) = 195.1 PEAK FLOW RATE (CFS) = 46.76

FLOW PROCESS FROM NODE 373.00 TO NODE 374.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 300.00 DOWNSTREAM (FEET) = 298.00
FLOW LENGTH (FEET) = 1188.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 4.86
ESTIMATED PIPE DIAMETER (INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 46.76
PIPE TRAVEL TIME (MIN.) = 4.08 Tc (MIN.) = 47.67
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

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) = 622.00 DOWNSTREAM (FEET) = 621.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 10.511
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.478
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.)
APARTMENTS - 1.50 0.50 0.200 56 10.51
APARTMENTS - 2.00 0.50 0.200 56 10.51
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF (CFS) = 4.34
TOTAL AREA (ACRES) = 3.50 PEAK FLOW RATE (CFS) = 4.34

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) = 621.00 DOWNSTREAM ELEVATION (FEET) = 612.00
STREET LENGTH (FEET) = 569.00 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) = 7.20
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.36
HALFSTREET FLOOD WIDTH (FEET) = 10.90
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.87
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.03
STREET FLOW TRAVEL TIME (MIN.) = 3.30 Tc (MIN.) = 13.82
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.273

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.20 0.50 0.200 -
USER-DEFINED - 3.20 0.50 0.200 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA (ACRES) = 5.40 SUBAREA RUNOFF (CFS) = 5.70

EFFECTIVE AREA(ACRES) = 8.90 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 8.9 PEAK FLOW RATE(CFS) = 9.40

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.38 HALFSTREET FLOOD WIDTH(FEET) = 12.30
FLOW VELOCITY(FEET/SEC.) = 3.04 DEPTH*VELOCITY(FT*FT/SEC.) = 1.16
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 322.00 = 899.00 FEET.

FLOW PROCESS FROM NODE 322.00 TO NODE 324.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 612.00 DOWNSTREAM ELEVATION(FEET) = 590.00
STREET LENGTH(FEET) = 891.00 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) = 14.22

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.40
HALFSTREET FLOOD WIDTH(FEET) = 13.32
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.00
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.60
STREET FLOW TRAVEL TIME(MIN.) = 3.71 Tc(MIN.) = 17.53

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.109

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.00	0.50	0.400	-
USER-DEFINED	-	5.70	0.50	0.400	-
USER-DEFINED	-	1.20	0.50	0.350	-
USER-DEFINED	-	0.30	0.50	0.850	-
USER-DEFINED	-	0.90	0.50	0.850	-
USER-DEFINED	-	0.80	0.50	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.420
SUBAREA AREA(ACRES) = 11.90 SUBAREA RUNOFF(CFS) = 9.63
EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 17.71

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.65
FLOW VELOCITY(FEET/SEC.) = 4.20 DEPTH*VELOCITY(FT*FT/SEC.) = 1.78
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 324.00 = 1790.00 FEET.

FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.53

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.109

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.70	0.50	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.70 SUBAREA RUNOFF(CFS) = 1.62
EFFECTIVE AREA(ACRES) = 22.50 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 22.5 PEAK FLOW RATE(CFS) = 19.33

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) = 590.00 DOWNSTREAM(FEET) = 575.00
FLOW LENGTH(FEET) = 529.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.59
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.33
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 18.29
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 325.00 = 2319.00 FEET.

FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.29

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.082

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.50	0.100	-
USER-DEFINED	-	4.30	0.50	0.600	-
USER-DEFINED	-	0.30	0.50	0.100	-
USER-DEFINED	-	2.10	0.50	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.544
SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 5.24
EFFECTIVE AREA(ACRES) = 29.70 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 29.7 PEAK FLOW RATE(CFS) = 24.02

FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

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

C-17

C-17

C-18

C-18

MAINLINE Tc(MIN.) = 18.29
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.082
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.850	-
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	4.80	0.50	0.600	-
USER-DEFINED	-	10.20	0.50	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.606
 SUBAREA AREA(ACRES) = 15.30 SUBAREA RUNOFF(CFS) = 10.72
 EFFECTIVE AREA(ACRES) = 45.00 AREA-AVERAGED Fm(INCH/HR) = 0.22
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 45.0 PEAK FLOW RATE(CFS) = 34.74

 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) = 575.00 DOWNSTREAM(FEET) = 515.00
 FLOW LENGTH(FEET) = 284.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.51
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 34.74
 PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 18.46
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 326.00 = 2603.00 FEET.

 FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

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

C-14

MAINLINE Tc(MIN.) = 18.46
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.076
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.70	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.850	-
USER-DEFINED	-	0.80	0.50	0.900	-
USER-DEFINED	-	1.40	0.50	0.100	-
USER-DEFINED	-	2.30	0.50	0.900	-
USER-DEFINED	-	0.10	0.50	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.582
 SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 3.81
 EFFECTIVE AREA(ACRES) = 50.40 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 38.31

 FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

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

C-14

MAINLINE Tc(MIN.) = 18.46
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.076
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.10	0.50	0.100	-
USER-DEFINED	-	2.80	0.50	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.557
 SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 3.51
 EFFECTIVE AREA(ACRES) = 55.30 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 55.3 PEAK FLOW RATE(CFS) = 41.82

 FLOW PROCESS FROM NODE 326.00 TO NODE 333.00 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(FEET) = 515.00 DOWNSTREAM(FEET) = 500.00
 FLOW LENGTH(FEET) = 1644.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.09
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 41.82
 PIPE TRAVEL TIME(MIN.) = 3.01 Tc(MIN.) = 21.47
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

 FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

C-20

MAINLINE Tc(MIN.) = 21.47
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.985
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.40	0.50	0.100	-
USER-DEFINED	-	2.20	0.50	0.900	-
USER-DEFINED	-	1.80	0.50	0.100	-
USER-DEFINED	-	0.30	0.50	0.900	-
USER-DEFINED	-	5.60	0.50	0.100	-
USER-DEFINED	-	4.10	0.50	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.467
 SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 9.74
 EFFECTIVE AREA(ACRES) = 69.70 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 69.7 PEAK FLOW RATE(CFS) = 47.04

 FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 21.47
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.985
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 0.20 0.50 0.600 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.12
 EFFECTIVE AREA(ACRES) = 69.90 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 69.9 PEAK FLOW RATE(CFS) = 47.16

C-20

 FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 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.) = 21.47
 RAINFALL INTENSITY(INCH/HR) = 0.98
 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50
 AREA-AVERAGED Ap = 0.47
 EFFECTIVE STREAM AREA(ACRES) = 69.90
 TOTAL STREAM AREA(ACRES) = 69.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 47.16

 FLOW PROCESS FROM NODE 327.00 TO NODE 327.50 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) = 615.00 DOWNSTREAM(FEET) = 614.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.844
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.531
 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 - 0.40 0.50 0.100 56 9.84
 PUBLIC PARK - 0.20 0.50 0.850 56 15.64
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" - 0.10 0.50 0.400 56 12.11
 COMMERCIAL - 0.10 0.50 0.100 56 9.84
 PUBLIC PARK - 0.10 0.50 0.850 56 15.64
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.383
 SUBAREA RUNOFF(CFS) = 1.08
 TOTAL AREA(ACRES) = 0.90 PEAK FLOW RATE(CFS) = 1.08

C-21

 FLOW PROCESS FROM NODE 327.50 TO NODE 328.00 IS CODE = 62

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

 UPSTREAM ELEVATION(FEET) = 614.00 DOWNSTREAM ELEVATION(FEET) = 610.00
 STREET LENGTH(FEET) = 425.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 30.00

C-21.1

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) = 2.70
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.30
 HALFSTREET FLOOD WIDTH(FEET) = 7.53
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.93
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.57
 STREET FLOW TRAVEL TIME(MIN.) = 3.68 Tc(MIN.) = 13.52
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.292

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 1.00 0.50 0.100 -
 USER-DEFINED - 0.30 0.50 0.850 -
 USER-DEFINED - 0.20 0.50 0.400 -
 USER-DEFINED - 0.90 0.50 0.100 -
 USER-DEFINED - 0.60 0.50 0.850 -
 USER-DEFINED - 0.20 0.50 0.400 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.348
 SUBAREA AREA(ACRES) = 3.20 SUBAREA RUNOFF(CFS) = 3.22
 EFFECTIVE AREA(ACRES) = 4.10 AREA-AVERAGED Fm(INCH/HR) = 0.18
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.36
 TOTAL AREA(ACRES) = 4.1 PEAK FLOW RATE(CFS) = 4.11

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 9.41
 FLOW VELOCITY(FEET/SEC.) = 2.09 DEPTH*VELOCITY(FT*FT/SEC.) = 0.69
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 328.00 = 754.00 FEET.

 FLOW PROCESS FROM NODE 328.00 TO NODE 329.00 IS CODE = 62

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

 UPSTREAM ELEVATION(FEET) = 610.00 DOWNSTREAM ELEVATION(FEET) = 595.00
 STREET LENGTH(FEET) = 366.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 30.00

C-22

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) = 6.94
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.31
 HALFSTREET FLOOD WIDTH(FEET) = 8.47
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.16
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.31
 STREET FLOW TRAVEL TIME(MIN.) = 1.47 Tc(MIN.) = 14.99

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.201

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.100	-
USER-DEFINED	-	0.20	0.50	0.850	-
USER-DEFINED	-	3.10	0.50	0.400	-
USER-DEFINED	-	0.50	0.50	0.100	-
USER-DEFINED	-	0.30	0.50	0.850	-
USER-DEFINED	-	2.10	0.50	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.407
 SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 5.65
 EFFECTIVE AREA(ACRES) = 10.40 AREA-AVERAGED Fm(INCH/HR) = 0.19
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 10.4 PEAK FLOW RATE(CFS) = 9.43

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.34 HALFSTREET FLOOD WIDTH(FEET) = 9.84
 FLOW VELOCITY(FEET/SEC.) = 4.45 DEPTH*VELOCITY(FT*FT/SEC.) = 1.51
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 329.00 = 1120.00 FEET.

 FLOW PROCESS FROM NODE 329.00 TO NODE 329.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 14.99

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.201

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.80	0.50	0.400	-
USER-DEFINED	-	0.10	0.50	0.600	-
USER-DEFINED	-	6.10	0.50	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.402
 SUBAREA AREA(ACRES) = 9.00 SUBAREA RUNOFF(CFS) = 8.10
 EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.20
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 17.52

 FLOW PROCESS FROM NODE 329.00 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) = 595.00 DOWNSTREAM(FEET) = 575.00
 FLOW LENGTH(FEET) = 378.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.29
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 17.52
 PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 15.43
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 330.00 = 1498.00 FEET.

 FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 15.43

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.185

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.90	0.50	0.850	-
USER-DEFINED	-	4.10	0.50	0.600	-
USER-DEFINED	-	2.50	0.50	0.400	-
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	10.20	0.50	0.600	-
USER-DEFINED	-	0.90	0.50	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.561
 SUBAREA AREA(ACRES) = 19.20 SUBAREA RUNOFF(CFS) = 15.62
 EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 32.86

 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) = 575.00 DOWNSTREAM(FEET) = 555.00
 FLOW LENGTH(FEET) = 457.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.61
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 32.86
 PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 15.92
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 331.00 = 1955.00 FEET.

 FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 15.92

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.167

SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         1.10    0.50    0.850   -
USER-DEFINED        -         0.80    0.50    0.900   -
USER-DEFINED        -        10.50    0.50    0.600   -
USER-DEFINED        -         0.30    0.50    0.100   -
USER-DEFINED        -         0.50    0.50    0.900   -
USER-DEFINED        -        13.70    0.50    0.600   -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.619
SUBAREA AREA (ACRES) = 26.90    SUBAREA RUNOFF (CFS) = 20.76
EFFECTIVE AREA (ACRES) = 65.50    AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.50    AREA-AVERAGED Ap = 0.54
TOTAL AREA (ACRES) = 65.5    PEAK FLOW RATE (CFS) = 53.01

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```

FLOW PROCESS FROM NODE 331.00 TO NODE 332.00 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) = 555.00 DOWNSTREAM (FEET) = 520.00
FLOW LENGTH (FEET) = 324.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 24.65
ESTIMATED PIPE DIAMETER (INCH) = 24.00    NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 53.01
PIPE TRAVEL TIME (MIN.) = 0.22    Tc (MIN.) = 16.14
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 332.00 = 2279.00 FEET.

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FLOW PROCESS FROM NODE 332.00 TO NODE 332.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc (MIN.) = 16.14
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.159
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         0.10    0.50    0.100   -
USER-DEFINED        -         2.10    0.50    0.900   -
USER-DEFINED        -         3.70    0.50    0.100   -
USER-DEFINED        -         5.00    0.50    0.900   -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.621
SUBAREA AREA (ACRES) = 10.90    SUBAREA RUNOFF (CFS) = 8.32
EFFECTIVE AREA (ACRES) = 76.40    AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.50    AREA-AVERAGED Ap = 0.55
TOTAL AREA (ACRES) = 76.4    PEAK FLOW RATE (CFS) = 60.87

```

```

FLOW PROCESS FROM NODE 332.00 TO NODE 333.00 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) = 520.00 DOWNSTREAM (FEET) = 500.00

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FLOW LENGTH (FEET) = 1740.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 10.86
ESTIMATED PIPE DIAMETER (INCH) = 36.00    NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 60.87
PIPE TRAVEL TIME (MIN.) = 2.67    Tc (MIN.) = 18.81
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 333.00 = 4019.00 FEET.

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FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc (MIN.) = 18.81
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.063
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/   SCS SOIL  AREA    Fp      Ap      SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         1.20    0.50    0.100   -
USER-DEFINED        -         4.40    0.50    0.900   -
USER-DEFINED        -         3.90    0.50    0.100   -
USER-DEFINED        -         9.80    0.50    0.900   -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.689
SUBAREA AREA (ACRES) = 19.30    SUBAREA RUNOFF (CFS) = 12.48
EFFECTIVE AREA (ACRES) = 95.70    AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.50    AREA-AVERAGED Ap = 0.58
TOTAL AREA (ACRES) = 95.7    PEAK FLOW RATE (CFS) = 66.74

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FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 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.) = 18.81
RAINFALL INTENSITY (INCH/HR) = 1.06
AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.58
EFFECTIVE STREAM AREA (ACRES) = 95.70
TOTAL STREAM AREA (ACRES) = 95.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 66.74

```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	47.16	21.47	0.985	0.50 (0.24)	0.47	69.9	320.00
2	66.74	18.81	1.063	0.50 (0.29)	0.58	95.7	327.00

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	47.16	21.47	0.985	0.50 (0.24)	0.47	69.9	320.00
2	66.74	18.81	1.063	0.50 (0.29)	0.58	95.7	327.00

1 112.36 18.81 1.063 0.50(0.27) 0.53 156.9 327.00
2 107.16 21.47 0.985 0.50(0.27) 0.53 165.6 320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 112.36 Tc(MIN.) = 18.81
EFFECTIVE AREA(ACRES) = 156.93 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 165.6
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 334.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 500.00 DOWNSTREAM(FEET) = 468.00
FLOW LENGTH(FEET) = 819.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.02
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 112.36
PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 19.49
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.49
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.038

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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
USER-DEFINED	-	4.00	0.50	0.200	-
USER-DEFINED	-	2.30	0.50	0.100	-
USER-DEFINED	-	1.00	0.50	0.100	-
USER-DEFINED	-	0.40	0.50	0.850	-
USER-DEFINED	-	2.40	0.50	0.850	-
USER-DEFINED	-	3.50	0.50	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.310
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 10.82
EFFECTIVE AREA(ACRES) = 170.53 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 179.2 PEAK FLOW RATE(CFS) = 119.71

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.49
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.038

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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
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USER-DEFINED - 2.00 0.50 0.200 -
USER-DEFINED - 1.60 0.50 0.400 -
USER-DEFINED - 2.10 0.50 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA(ACRES) = 5.70 SUBAREA RUNOFF(CFS) = 4.48
EFFECTIVE AREA(ACRES) = 176.23 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 184.9 PEAK FLOW RATE(CFS) = 124.19

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 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.) = 19.49
RAINFALL INTENSITY(INCH/HR) = 1.04
AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.51
EFFECTIVE STREAM AREA(ACRES) = 176.23
TOTAL STREAM AREA(ACRES) = 184.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 124.19

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FLOW PROCESS FROM NODE 350.00 TO NODE 351.00 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) = 495.00 DOWNSTREAM(FEET) = 492.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.730
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.465
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 "3-4 DWELLINGS/ACRE"	-	0.80	0.50	0.600	56	10.73
RESIDENTIAL "3-4 DWELLINGS/ACRE"	-	1.70	0.50	0.600	56	10.73

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA RUNOFF(CFS) = 2.62
TOTAL AREA(ACRES) = 2.50 PEAK FLOW RATE(CFS) = 2.62

FLOW PROCESS FROM NODE 351.00 TO NODE 352.00 IS CODE = 62

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

=====

UPSTREAM ELEVATION(FEET) = 492.00 DOWNSTREAM ELEVATION(FEET) = 488.00
STREET LENGTH(FEET) = 456.00 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) = 4.14
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 9.59
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.04
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.68
STREET FLOW TRAVEL TIME(MIN.) = 3.73 Tc(MIN.) = 14.46
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.233

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 3.20 0.50 0.600 -
USER-DEFINED - 0.40 0.50 0.600 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 3.02
EFFECTIVE AREA(ACRES) = 6.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 6.1 PEAK FLOW RATE(CFS) = 5.12

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 10.66
FLOW VELOCITY(FEET/SEC.) = 2.12 DEPTH*VELOCITY(FT*FT/SEC.) = 0.75
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 352.00 = 786.00 FEET.

FLOW PROCESS FROM NODE 352.00 TO NODE 353.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 488.00 DOWNSTREAM(FEET) = 485.00
FLOW LENGTH(FEET) = 883.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.71
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.12
PIPE TRAVEL TIME(MIN.) = 3.97 Tc(MIN.) = 18.43
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 353.00 = 1669.00 FEET.

FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.43
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.077

SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.50 0.50 0.600 -
USER-DEFINED - 1.10 0.50 0.400 -
USER-DEFINED - 0.10 0.50 0.850 -
USER-DEFINED - 0.60 0.50 0.600 -
USER-DEFINED - 4.50 0.50 0.400 -
USER-DEFINED - 1.70 0.50 0.600 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.471
SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 6.43
EFFECTIVE AREA(ACRES) = 14.60 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 10.70

FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.43
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.077
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.30 0.50 0.400 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.24
EFFECTIVE AREA(ACRES) = 14.90 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.9 PEAK FLOW RATE(CFS) = 10.93

FLOW PROCESS FROM NODE 353.00 TO NODE 334.00 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) = 468.00
FLOW LENGTH(FEET) = 1136.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.81
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.93
PIPE TRAVEL TIME(MIN.) = 2.43 Tc(MIN.) = 20.85
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 334.00 = 2805.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.85
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.999
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

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```

LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED  -       0.90     0.50       0.100      -
USER-DEFINED  -       2.00     0.50       0.850      -
USER-DEFINED  -       1.40     0.50       0.200      -
USER-DEFINED  -       1.50     0.50       0.400      -
USER-DEFINED  -       0.50     0.50       0.100      -
USER-DEFINED  -       1.50     0.50       0.850      -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512
SUBAREA AREA(ACRES) = 7.80     SUBAREA RUNOFF(CFS) = 5.22
EFFECTIVE AREA(ACRES) = 22.70  AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 22.7     PEAK FLOW RATE(CFS) = 15.12

```

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

```

MAINLINE Tc(MIN.) = 20.85
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.999
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA    Fp      Ap    SCS
LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED      -        3.10    0.50    0.200  -
USER-DEFINED      -        1.40    0.50    0.400  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
SUBAREA AREA(ACRES) = 4.50     SUBAREA RUNOFF(CFS) = 3.52
EFFECTIVE AREA(ACRES) = 27.20  AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 27.2     PEAK FLOW RATE(CFS) = 18.63

```

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

```

MAINLINE Tc(MIN.) = 20.85
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.999
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA    Fp      Ap    SCS
LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED      -        0.50    0.50    0.850  -
USER-DEFINED      -        0.10    0.50    0.900  -
USER-DEFINED      -        1.20    0.50    0.600  -
USER-DEFINED      -        2.70    0.50    0.850  -
USER-DEFINED      -        0.20    0.50    0.900  -
USER-DEFINED      -        7.30    0.50    0.600  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.674
SUBAREA AREA(ACRES) = 12.00    SUBAREA RUNOFF(CFS) = 7.15
EFFECTIVE AREA(ACRES) = 39.20  AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 39.2     PEAK FLOW RATE(CFS) = 25.79

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FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
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MAINLINE Tc(MIN.) = 20.85
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.999
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/  SCS SOIL  AREA    Fp      Ap    SCS
LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED      -        0.10    0.50    0.100  -
USER-DEFINED      -        0.60    0.50    0.850  -
USER-DEFINED      -        3.10    0.50    0.600  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.626
SUBAREA AREA(ACRES) = 3.80     SUBAREA RUNOFF(CFS) = 2.35
EFFECTIVE AREA(ACRES) = 43.00  AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 43.0     PEAK FLOW RATE(CFS) = 28.13

```

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FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 1

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

```

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 20.85
RAINFALL INTENSITY(INCH/HR) = 1.00
AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.54
EFFECTIVE STREAM AREA(ACRES) = 43.00
TOTAL STREAM AREA(ACRES) = 43.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 28.13

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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	124.19	19.49	1.038	0.50(0.26)	0.51	176.2	327.00
1	118.79	22.15	0.968	0.50(0.25)	0.51	184.9	320.00
2	28.13	20.85	0.999	0.50(0.27)	0.54	43.0	350.00

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	151.89	19.49	1.038	0.50(0.26)	0.52	216.4	327.00
2	149.55	20.85	0.999	0.50(0.26)	0.52	223.7	350.00
3	145.71	22.15	0.968	0.50(0.26)	0.52	227.9	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 151.89 Tc(MIN.) = 19.49
EFFECTIVE AREA(ACRES) = 216.42 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 227.9
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 335.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 468.00 DOWNSTREAM(FEET) = 422.00
FLOW LENGTH(FEET) = 1086.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.10
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 151.89
PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 20.31
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 335.00 = 6152.00 FEET.

FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.31
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.013
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 3.00 0.50 0.100 -
USER-DEFINED - 4.20 0.50 0.100 -
USER-DEFINED - 0.60 0.50 0.850 -
USER-DEFINED - 10.80 0.50 0.850 -
USER-DEFINED - 1.00 0.50 0.900 -
USER-DEFINED - 3.90 0.50 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.631
SUBAREA AREA(ACRES) = 23.50 SUBAREA RUNOFF(CFS) = 14.75
EFFECTIVE AREA(ACRES) = 239.92 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 251.4 PEAK FLOW RATE(CFS) = 161.61

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FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.31
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.013
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.10 0.50 0.600 -
USER-DEFINED - 0.10 0.50 0.600 -
USER-DEFINED - 0.10 0.50 0.500 -
USER-DEFINED - 9.20 0.50 0.500 -
USER-DEFINED - 0.70 0.50 0.400 -
USER-DEFINED - 2.90 0.50 0.400 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.474
SUBAREA AREA(ACRES) = 13.10 SUBAREA RUNOFF(CFS) = 9.14

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EFFECTIVE AREA(ACRES) = 253.02 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 264.5 PEAK FLOW RATE(CFS) = 170.75

FLOW PROCESS FROM NODE 335.00 TO NODE 336.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 422.00 DOWNSTREAM(FEET) = 380.00
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.91
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 170.75
PIPE TRAVEL TIME(MIN.) = 0.52 Tc(MIN.) = 20.83
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 336.00 = 6932.00 FEET.

FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.83
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.000
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.70 0.50 0.100 -
USER-DEFINED - 0.60 0.50 0.100 -
USER-DEFINED - 1.60 0.50 0.100 -
USER-DEFINED - 0.10 0.50 0.850 -
USER-DEFINED - 3.70 0.50 0.200 -
USER-DEFINED - 5.60 0.50 0.200 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.182
SUBAREA AREA(ACRES) = 12.30 SUBAREA RUNOFF(CFS) = 10.06
EFFECTIVE AREA(ACRES) = 265.32 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 276.8 PEAK FLOW RATE(CFS) = 177.97

FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.83
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.000
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.20 0.50 0.900 -
USER-DEFINED - 0.50 0.50 0.900 -
USER-DEFINED - 0.60 0.50 0.900 -
USER-DEFINED - 3.40 0.50 0.600 -
USER-DEFINED - 16.80 0.50 0.600 -
USER-DEFINED - 0.70 0.50 0.400 -

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SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.611
SUBAREA AREA(ACRES) = 22.20 SUBAREA RUNOFF(CFS) = 13.87
EFFECTIVE AREA(ACRES) = 287.52 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 299.0 PEAK FLOW RATE(CFS) = 191.84

FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 20.83					
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.000	C-33				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	6.30	0.50	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 4.54
EFFECTIVE AREA(ACRES) = 293.82 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 305.3 PEAK FLOW RATE(CFS) = 196.37

FLOW PROCESS FROM NODE 336.00 TO NODE 337.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 380.00 DOWNSTREAM(FEET) = 350.00
FLOW LENGTH(FEET) = 803.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 32.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.67
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 196.37
PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 21.42
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 337.00 = 7735.00 FEET.

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 21.42					
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.986	C-36				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	0.40	0.50	0.200	-
USER-DEFINED	-	3.00	0.50	0.200	-
USER-DEFINED	-	1.30	0.50	0.100	-
USER-DEFINED	-	2.70	0.50	0.100	-
USER-DEFINED	-	6.00	0.50	0.100	-
USER-DEFINED	-	1.30	0.50	0.850	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.189

SUBAREA AREA(ACRES) = 14.70 SUBAREA RUNOFF(CFS) = 11.79
EFFECTIVE AREA(ACRES) = 308.52 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 320.0 PEAK FLOW RATE(CFS) = 204.42

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 21.42					
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.986	C-36				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	3.30	0.50	0.850	-
USER-DEFINED	-	1.50	0.50	0.850	-
USER-DEFINED	-	2.50	0.50	0.200	-
USER-DEFINED	-	6.70	0.50	0.200	-
USER-DEFINED	-	2.20	0.50	0.900	-
USER-DEFINED	-	0.10	0.50	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.488
SUBAREA AREA(ACRES) = 16.30 SUBAREA RUNOFF(CFS) = 10.88
EFFECTIVE AREA(ACRES) = 324.82 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 336.3 PEAK FLOW RATE(CFS) = 215.30

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 21.42					
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.986	C-36				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	0.60	0.50	0.600	-
USER-DEFINED	-	4.60	0.50	0.400	-
USER-DEFINED	-	2.90	0.50	0.400	-
USER-DEFINED	-	0.20	0.50	0.600	-
USER-DEFINED	-	5.90	0.50	0.600	-
USER-DEFINED	-	6.00	0.50	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.526
SUBAREA AREA(ACRES) = 20.20 SUBAREA RUNOFF(CFS) = 13.14
EFFECTIVE AREA(ACRES) = 345.02 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 356.5 PEAK FLOW RATE(CFS) = 228.44

FLOW PROCESS FROM NODE 337.00 TO NODE 338.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 350.00 DOWNSTREAM(FEET) = 332.00

FLOW LENGTH(FEET) = 838.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.86
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 228.44
 PIPE TRAVEL TIME(MIN.) = 0.74 Tc(MIN.) = 22.16
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 338.00 = 8573.00 FEET.

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.16
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	6.90	0.50	0.200	-
USER-DEFINED	-	1.40	0.50	0.100	-
USER-DEFINED	-	1.90	0.50	0.100	-
USER-DEFINED	-	5.90	0.50	0.100	-
USER-DEFINED	-	3.60	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.154
 SUBAREA AREA(ACRES) = 19.80 SUBAREA RUNOFF(CFS) = 15.88
 EFFECTIVE AREA(ACRES) = 364.82 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 376.3 PEAK FLOW RATE(CFS) = 238.81

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.16
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.60	0.50	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA(ACRES) = 1.60 SUBAREA RUNOFF(CFS) = 1.25
 EFFECTIVE AREA(ACRES) = 366.42 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 377.9 PEAK FLOW RATE(CFS) = 240.06

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.16
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
 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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LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	2.10	0.50	0.100	-
USER-DEFINED	-	8.50	0.50	0.100	-
USER-DEFINED	-	1.90	0.50	0.100	-
USER-DEFINED	-	0.70	0.50	0.100	-
USER-DEFINED	-	2.60	0.50	0.850	-
USER-DEFINED	-	0.60	0.50	0.850	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.246
 SUBAREA AREA(ACRES) = 16.40 SUBAREA RUNOFF(CFS) = 12.47
 EFFECTIVE AREA(ACRES) = 382.82 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 394.3 PEAK FLOW RATE(CFS) = 252.53

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.16
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.50	0.200	-
USER-DEFINED	-	6.20	0.50	0.100	-
USER-DEFINED	-	1.00	0.50	0.200	-
USER-DEFINED	-	1.70	0.50	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.132
 SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 7.39
 EFFECTIVE AREA(ACRES) = 391.92 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 403.4 PEAK FLOW RATE(CFS) = 259.92

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.16
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.70	0.50	0.100	-
USER-DEFINED	-	1.70	0.50	0.100	-
USER-DEFINED	-	0.80	0.50	0.100	-
USER-DEFINED	-	2.00	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.850	-
USER-DEFINED	-	0.10	0.50	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.116
 SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 4.42
 EFFECTIVE AREA(ACRES) = 397.32 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 408.8 PEAK FLOW RATE(CFS) = 264.34

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*****
FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.16
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         0.10    0.50    0.200  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.10    SUBAREA RUNOFF(CFS) = 0.08
EFFECTIVE AREA(ACRES) = 397.42  AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 408.9    PEAK FLOW RATE(CFS) = 264.42

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*****
FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.16
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         1.30    0.50    0.100  -
USER-DEFINED        -         0.10    0.50    0.100  -
USER-DEFINED        -         1.10    0.50    0.100  -
USER-DEFINED        -         0.20    0.50    0.600  -
USER-DEFINED        -         0.50    0.50    0.600  -
USER-DEFINED        -         1.20    0.50    0.600  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.316
SUBAREA AREA(ACRES) = 4.40    SUBAREA RUNOFF(CFS) = 3.21
EFFECTIVE AREA(ACRES) = 401.82  AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 413.3    PEAK FLOW RATE(CFS) = 267.63

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```

*****
FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.16
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         4.40    0.50    0.100  -
USER-DEFINED        -         3.50    0.50    0.100  -
USER-DEFINED        -         4.70    0.50    0.100  -
USER-DEFINED        -         0.30    0.50    0.200  -
USER-DEFINED        -         0.60    0.50    0.600  -
USER-DEFINED        -         0.60    0.50    0.600  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

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SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.145
SUBAREA AREA(ACRES) = 14.10    SUBAREA RUNOFF(CFS) = 11.37
EFFECTIVE AREA(ACRES) = 415.92  AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 427.4    PEAK FLOW RATE(CFS) = 278.99

```

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*****
FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 22.16
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         3.30    0.50    0.600  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 3.30    SUBAREA RUNOFF(CFS) = 1.98
EFFECTIVE AREA(ACRES) = 419.22  AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 430.7    PEAK FLOW RATE(CFS) = 280.98

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*****
FLOW PROCESS FROM NODE 338.00 TO NODE 339.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 332.00 DOWNSTREAM(FEET) = 301.00
FLOW LENGTH(FEET) = 1956.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 44.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.94
ESTIMATED PIPE DIAMETER(INCH) = 60.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 280.98
PIPE TRAVEL TIME(MIN.) = 1.82    Tc(MIN.) = 23.98
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

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LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	411.24	18.46	1.076	0.50 (0.21)	0.42	501.7	300.00
2	413.34	23.98	0.925	0.50 (0.21)	0.43	605.6	327.00
3	401.40	25.36	0.895	0.50 (0.21)	0.43	614.7	350.00
4	387.96	26.71	0.876	0.50 (0.21)	0.43	620.7	320.00
5	353.23	30.77	0.819	0.50 (0.21)	0.43	626.1	306.00
TOTAL AREA (ACRES) =		626.1					

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 413.34 Tc(MIN.) = 23.978
EFFECTIVE AREA(ACRES) = 605.56 AREA-AVERAGED Fm(INCH/HR) = 0.21
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 626.1
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

FLOW PROCESS FROM NODE 339.00 TO NODE 340.00 IS CODE = 56

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

>>>>TRAVELTIME THRU SUBAREA<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 301.00 DOWNSTREAM(FEET) = 300.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 196.00 CHANNEL SLOPE = 0.0051

GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0

"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030

*ESTIMATED CHANNEL HEIGHT(FEET) = 1.58

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.896

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	31.90	0.50	0.100	-
USER-DEFINED	-	2.30	0.50	0.100	-
USER-DEFINED	-	1.90	0.50	0.100	-
USER-DEFINED	-	1.00	0.50	0.100	-
USER-DEFINED	-	3.10	0.50	0.850	-
USER-DEFINED	-	0.80	0.50	0.850	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.171

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 428.28

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.46

AVERAGE FLOW DEPTH(FEET) = 0.58 TRAVEL TIME(MIN.) = 1.33

Tc(MIN.) = 25.31

SUBAREA AREA(ACRES) = 41.00 SUBAREA RUNOFF(CFS) = 29.89

EFFECTIVE AREA(ACRES) = 646.56 AREA-AVERAGED Fm(INCH/HR) = 0.21

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.41

TOTAL AREA(ACRES) = 667.1 PEAK FLOW RATE(CFS) = 413.34

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0

"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030

*ESTIMATED CHANNEL HEIGHT(FEET) = 1.57

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.57 FLOW VELOCITY(FEET/SEC.) = 2.41

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 340.00 = 10725.00 FEET.

FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 25.31

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.896

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.00	0.50	0.900	-
USER-DEFINED	-	1.80	0.50	0.900	-
USER-DEFINED	-	2.40	0.50	0.900	-
USER-DEFINED	-	0.10	0.50	0.850	-
USER-DEFINED	-	0.10	0.50	0.850	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.899

SUBAREA AREA(ACRES) = 8.40 SUBAREA RUNOFF(CFS) = 3.37

EFFECTIVE AREA(ACRES) = 654.96 AREA-AVERAGED Fm(INCH/HR) = 0.21

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.42

TOTAL AREA(ACRES) = 675.5 PEAK FLOW RATE(CFS) = 413.34

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 340.00 TO NODE 374.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 300.00 DOWNSTREAM(FEET) = 298.00

FLOW LENGTH(FEET) = 221.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 75.0 INCH PIPE IS 59.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 15.83

ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 413.34

PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 25.54

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 374.00 = 10946.00 FEET.

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 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	Ae (ACRES)	HEADWATER NODE
1	411.24	20.03	1.019	0.50 (0.21)	0.41	551.1	300.00
2	413.34	25.54	0.892	0.50 (0.21)	0.42	655.0	327.00
3	401.40	26.94	0.873	0.50 (0.21)	0.42	664.1	350.00
4	390.62	28.31	0.854	0.50 (0.21)	0.42	670.1	320.00
5	358.60	32.43	0.796	0.50 (0.21)	0.42	675.5	306.00
LONGEST FLOWPATH FROM NODE		320.00 TO NODE 374.00 = 10946.00 FEET.					

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
---------------	---------	-----------	---------------------	------------------	----	------------	----------------

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1 46.76 47.67 0.629 0.50(0.39) 0.79 195.1 390.00
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	458.00	20.03	1.019	0.50(0.23)	0.46	633.1	300.00
2	460.09	25.54	0.892	0.50(0.23)	0.47	759.5	327.00
3	448.15	26.94	0.873	0.50(0.24)	0.47	774.3	350.00
4	437.37	28.31	0.854	0.50(0.24)	0.47	786.0	320.00
5	405.36	32.43	0.796	0.50(0.24)	0.48	808.2	306.00
6	303.03	47.67	0.629	0.50(0.25)	0.50	870.6	390.00

TOTAL AREA(ACRES) = 870.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 460.09 Tc(MIN.) = 25.538
EFFECTIVE AREA(ACRES) = 759.47 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 870.6
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 12

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

FLOW PROCESS FROM NODE 374.00 TO NODE 380.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 298.00 DOWNSTREAM(FEET) = 261.00
FLOW LENGTH(FEET) = 1402.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 48.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.61
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 460.09
PIPE TRAVEL TIME(MIN.) = 0.95 Tc(MIN.) = 26.49
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 380.00 = 15238.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 870.6 TC(MIN.) = 26.49
EFFECTIVE AREA(ACRES) = 759.47 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.468
PEAK FLOW RATE(CFS) = 460.09

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	458.00	20.98	0.996	0.50(0.23)	0.46	633.1	300.00
2	460.09	26.49	0.879	0.50(0.23)	0.47	759.5	327.00
3	448.15	27.91	0.859	0.50(0.24)	0.47	774.3	350.00
4	437.37	29.29	0.840	0.50(0.24)	0.47	786.0	320.00
5	405.36	33.41	0.782	0.50(0.24)	0.48	808.2	306.00
6	303.03	48.75	0.620	0.50(0.25)	0.50	870.6	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 SUBAREA C ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 10-YR EV DECEMBER 2018 CCHIUI *

FILE NAME: PA3C10EV.DAT
TIME/DATE OF STUDY: 15:11 12/18/2018

=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

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

USER SPECIFIED STORM EVENT(YEAR) = 5.00
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

Table with columns: NO., HALF WIDTH (FT), CROWN CROSSFALL (FT), STREET IN- / OUT- / PARK- SIDE / SIDE / WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GUTTER LIP (FT), GUTTER HIKE (FT), GEOMETRIES (n), MANNING FACTOR. Contains 3 rows of data.

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) = 320.00
ELEVATION DATA: UPSTREAM(FEET) = 640.00 DOWNSTREAM(FEET) = 634.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.766
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.687
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 B 0.20 0.30 0.100 56 6.77
PUBLIC PARK B 0.90 0.30 0.850 56 10.75
COMMERCIAL B 0.30 0.30 0.100 56 6.77
PUBLIC PARK B 1.90 0.30 0.850 56 10.75
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.736
SUBAREA RUNOFF(CFS) = 7.33
TOTAL AREA(ACRES) = 3.30 PEAK FLOW RATE(CFS) = 7.33

***** 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) = 634.00 DOWNSTREAM ELEVATION(FEET) = 630.00
STREET LENGTH(FEET) = 503.00 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) = 16.27
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.48
HALFSTREET FLOOD WIDTH(FEET) = 17.85
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.68
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.29
STREET FLOW TRAVEL TIME(MIN.) = 3.13 Tc(MIN.) = 9.90
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.170

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.50 0.30 0.100 56
PUBLIC PARK B 2.10 0.30 0.850 56
SCHOOL B 4.60 0.30 0.600 56
COMMERCIAL B 0.30 0.30 0.100 56
PUBLIC PARK B 1.40 0.30 0.850 56
SCHOOL B 1.10 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.647
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 17.78
EFFECTIVE AREA(ACRES) = 13.30 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) = 13.3 PEAK FLOW RATE(CFS) = 23.57

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.74
FLOW VELOCITY(FEET/SEC.) = 2.92 DEPTH*VELOCITY(FT*FT/SEC.) = 1.56
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 823.00 FEET.

FLOW PROCESS FROM NODE 302.00 TO NODE 302.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) =	9.90				
* 5 YEAR RAINFALL INTENSITY(INCH/HR) =	2.170				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
PUBLIC PARK	B	1.00	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	9.30	0.30	0.200	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.30	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.276
SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 22.54
EFFECTIVE AREA(ACRES) = 25.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 25.3 PEAK FLOW RATE(CFS) = 46.11

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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) = 630.00 DOWNSTREAM(FEET) = 625.00
FLOW LENGTH(FEET) = 651.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.77
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 46.11
PIPE TRAVEL TIME(MIN.) = 1.24 Tc(MIN.) = 11.14
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1474.00 FEET.

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) =	11.14				
* 5 YEAR RAINFALL INTENSITY(INCH/HR) =	2.031				
SUBAREA LOSS RATE DATA(AMC II):					
DEVELOPMENT TYPE/	SCS SOIL	AREA	Fp	Ap	SCS
LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	B	0.40	0.30	0.100	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.80	0.30	0.400	56

C-5

SCHOOL	B	1.30	0.30	0.600	56
COMMERCIAL	B	0.60	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.480
SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 8.66
EFFECTIVE AREA(ACRES) = 30.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 30.4 PEAK FLOW RATE(CFS) = 51.61

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) =	11.14				
* 5 YEAR RAINFALL INTENSITY(INCH/HR) =	2.031				
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	3.50	0.30	0.400	56
SCHOOL	B	5.20	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.520
SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 14.68
EFFECTIVE AREA(ACRES) = 39.10 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 39.1 PEAK FLOW RATE(CFS) = 66.29

C-5

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) =	11.14				
* 5 YEAR RAINFALL INTENSITY(INCH/HR) =	2.031				
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
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	7.40	0.30	0.200	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.50	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.215
SUBAREA AREA(ACRES) = 11.40 SUBAREA RUNOFF(CFS) = 20.18
EFFECTIVE AREA(ACRES) = 50.50 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 50.5 PEAK FLOW RATE(CFS) = 86.47

C-4

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

C-6

MAINLINE Tc(MIN.) = 11.14
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.031
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	4.70	0.30	0.100	56
PUBLIC PARK	B	2.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	4.90	0.30	0.200	56
COMMERCIAL	B	1.70	0.30	0.100	56
PUBLIC PARK	B	1.80	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	6.20	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.294
 SUBAREA AREA(ACRES) = 21.60 SUBAREA RUNOFF(CFS) = 37.77
 EFFECTIVE AREA(ACRES) = 72.10 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 72.1 PEAK FLOW RATE(CFS) = 124.24

 FLOW PROCESS FROM NODE 303.00 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) = 625.00 DOWNSTREAM(FEET) = 615.00
 FLOW LENGTH(FEET) = 1029.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.14
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 124.24
 PIPE TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 12.55
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 305.00 = 2503.00 FEET.

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.55
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.899
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.10	0.30	0.100	56
PUBLIC PARK	B	1.80	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.00	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	5.00	0.30	0.400	56
COMMERCIAL	B	2.80	0.30	0.100	56
PUBLIC PARK	B	0.90	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.367
 SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 21.90
 EFFECTIVE AREA(ACRES) = 85.70 AREA-AVERAGED Fm(INCH/HR) = 0.12

C-7

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
 TOTAL AREA(ACRES) = 85.7 PEAK FLOW RATE(CFS) = 137.58

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.55
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.899
 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	1.80	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.20	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.280
 SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 4.90
 EFFECTIVE AREA(ACRES) = 88.70 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
 TOTAL AREA(ACRES) = 88.7 PEAK FLOW RATE(CFS) = 142.48

C-7

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 12.55
 RAINFALL INTENSITY(INCH/HR) = 1.90
 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.38
 EFFECTIVE STREAM AREA(ACRES) = 88.70
 TOTAL STREAM AREA(ACRES) = 88.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 142.48

 FLOW PROCESS FROM NODE 306.00 TO NODE 307.00 IS CODE = 21

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 317.00
 ELEVATION DATA: UPSTREAM(FEET) = 646.00 DOWNSTREAM(FEET) = 645.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.296
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.699
 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.)
PUBLIC PARK	B	0.40	0.30	0.850	56	15.30
RESIDENTIAL						
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56	15.42

C-8

PUBLIC PARK B 1.50 0.30 0.850 56 15.30
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.20 0.30 0.900 56 15.42
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.857
 SUBAREA RUNOFF(CFS) = 2.86
 TOTAL AREA (ACRES) = 2.20 PEAK FLOW RATE (CFS) = 2.86

 FLOW PROCESS FROM NODE 307.00 TO NODE 307.10 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<
 =====
 UPSTREAM ELEVATION(FEET) = 645.00 DOWNSTREAM ELEVATION(FEET) = 641.00
 STREET LENGTH(FEET) = 375.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 30.00

C-8.1

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) = 5.42
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.35
 HALFSTREET FLOOD WIDTH(FEET) = 10.43
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.33
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.81
 STREET FLOW TRAVEL TIME(MIN.) = 2.69 Tc(MIN.) = 17.98
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.551

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.00	0.30	0.600	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.40	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.649
 SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 5.13
 EFFECTIVE AREA(ACRES) = 6.40 AREA-AVERAGED Fm(INCH/HR) = 0.22
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.72
 TOTAL AREA(ACRES) = 6.4 PEAK FLOW RATE(CFS) = 7.69

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38 HALFSTREET FLOOD WIDTH(FEET) = 12.23
 FLOW VELOCITY(FEET/SEC.) = 2.52 DEPTH*VELOCITY(FT*FT/SEC.) = 0.96
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 307.10 = 692.00 FEET.

 FLOW PROCESS FROM NODE 307.10 TO NODE 308.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 641.00 DOWNSTREAM ELEVATION(FEET) = 635.00
 STREET LENGTH(FEET) = 506.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 30.00

C-9

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) = 12.52
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.43
 HALFSTREET FLOOD WIDTH(FEET) = 14.80
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.91
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.24
 STREET FLOW TRAVEL TIME(MIN.) = 2.90 Tc(MIN.) = 20.88
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.426

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
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.80	0.30	0.600	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.30	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.554
 SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 9.64
 EFFECTIVE AREA(ACRES) = 14.90 AREA-AVERAGED Fm(INCH/HR) = 0.19
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.63
 TOTAL AREA(ACRES) = 14.9 PEAK FLOW RATE(CFS) = 16.61

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 16.60
 FLOW VELOCITY(FEET/SEC.) = 3.13 DEPTH*VELOCITY(FT*FT/SEC.) = 1.44
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 308.00 = 1198.00 FEET.

 FLOW PROCESS FROM NODE 308.00 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) = 635.00 DOWNSTREAM(FEET) = 615.00
 FLOW LENGTH(FEET) = 1516.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.5 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 8.18
 ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 16.61
 PIPE TRAVEL TIME (MIN.) = 3.09 Tc (MIN.) = 23.97
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.97
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.320 C-10

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.20	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.20	0.30	0.200	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.80	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.50	0.30	0.400	56
SCHOOL	B	0.20	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.289
 SUBAREA AREA (ACRES) = 5.00 SUBAREA RUNOFF (CFS) = 5.55
 EFFECTIVE AREA (ACRES) = 19.90 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 19.9 PEAK FLOW RATE (CFS) = 20.74

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.97
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.320 C-10

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.20	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.30	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.00	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	6.60	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.415
 SUBAREA AREA (ACRES) = 14.60 SUBAREA RUNOFF (CFS) = 15.71
 EFFECTIVE AREA (ACRES) = 34.50 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49

TOTAL AREA (ACRES) = 34.5 PEAK FLOW RATE (CFS) = 36.45

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.97
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.320 C-10

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
SCHOOL	B	0.20	0.30	0.600	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600					
SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF (CFS) = 0.21					
EFFECTIVE AREA (ACRES) = 34.70 AREA-AVERAGED Fm (INCH/HR) = 0.15					
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49					
TOTAL AREA (ACRES) = 34.7 PEAK FLOW RATE (CFS) = 36.65					

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION (MIN.) = 23.97
 RAINFALL INTENSITY (INCH/HR) = 1.32
 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.49
 EFFECTIVE STREAM AREA (ACRES) = 34.70
 TOTAL STREAM AREA (ACRES) = 34.70
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 36.65

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	142.48	12.55	1.899	0.30 (0.11)	0.38	88.7	300.00
2	36.65	23.97	1.320	0.30 (0.15)	0.49	34.7	306.00

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	171.13	12.55	1.899	0.30 (0.12)	0.40	106.9	300.00
2	132.90	23.97	1.320	0.30 (0.12)	0.41	123.4	306.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE (CFS) = 171.13 Tc (MIN.) = 12.55
 EFFECTIVE AREA (ACRES) = 106.87 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
 TOTAL AREA (ACRES) = 123.4
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

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*****
FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 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) = 480.00
FLOW LENGTH(FEET) = 2954.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.75
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 171.13
PIPE TRAVEL TIME(MIN.) = 2.07 Tc(MIN.) = 14.62
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 310.00 = 5668.00 FEET.

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*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 14.62
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.743
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 4.80 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.40 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.20 0.30 0.600 56
COMMERCIAL B 2.30 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.164
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 11.89
EFFECTIVE AREA(ACRES) = 114.67 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 131.2 PEAK FLOW RATE(CFS) = 171.13
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 14.62
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.743
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.10 0.30 0.100 56
PUBLIC PARK B 0.20 0.30 0.850 56
PUBLIC PARK B 2.30 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 6.40 0.30 0.200 56
RESIDENTIAL

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"11+ DWELLINGS/ACRE" B 2.60 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.70 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.371
SUBAREA AREA(ACRES) = 12.30 SUBAREA RUNOFF(CFS) = 18.06
EFFECTIVE AREA(ACRES) = 126.97 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 143.5 PEAK FLOW RATE(CFS) = 186.05

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*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 14.62
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.743
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" B 2.20 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 0.80 0.30 0.500 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 10.20 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 2.50 0.30 0.400 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 3.70 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.514
SUBAREA AREA(ACRES) = 19.50 SUBAREA RUNOFF(CFS) = 27.88
EFFECTIVE AREA(ACRES) = 146.47 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 163.0 PEAK FLOW RATE(CFS) = 213.93

```

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*****
FLOW PROCESS FROM NODE 310.00 TO NODE 311.00 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) = 430.00
FLOW LENGTH(FEET) = 1056.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 32.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.40
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 213.93
PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 15.31
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 311.00 = 6724.00 FEET.
*****
FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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C-12

C-11

C-12


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=====
MAINLINE Tc(MIN.) = 15.31
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.698
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B        1.60   0.30  0.100  56
COMMERCIAL          B        3.60   0.30  0.100  56
PUBLIC PARK         B        0.10   0.30  0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        3.90   0.30  0.200  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        5.10   0.30  0.200  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        0.80   0.30  0.600  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.191
SUBAREA AREA(ACRES) = 15.10   SUBAREA RUNOFF(CFS) = 22.30
EFFECTIVE AREA(ACRES) = 161.57   AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 178.1   PEAK FLOW RATE(CFS) = 230.32

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C-13

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*****
FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81

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

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=====
MAINLINE Tc(MIN.) = 15.31
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.698
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" B        6.70   0.30  0.600  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 6.70   SUBAREA RUNOFF(CFS) = 9.15
EFFECTIVE AREA(ACRES) = 168.27   AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 184.8   PEAK FLOW RATE(CFS) = 239.48

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C-13

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*****
FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 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) = 373.00
FLOW LENGTH(FEET) = 1373.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.4 INCHES
PIPE-VELOCITY(VELOCITY(VEET/SEC.) = 24.86
ESTIMATED PIPE DIAMETER(INCH) = 48.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 239.48
PIPE TRAVEL TIME(MIN.) = 0.92   Tc(MIN.) = 16.24
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 312.00 = 8097.00 FEET.

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*****
FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.24
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.643
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B        1.50   0.30  0.100  56
COMMERCIAL          B        4.50   0.30  0.100  56
APARTMENTS         B        3.40   0.30  0.200  56
COMMERCIAL          B        0.30   0.30  0.100  56
PUBLIC PARK         B        0.10   0.30  0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B        0.20   0.30  0.900  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.157
SUBAREA AREA(ACRES) = 10.00   SUBAREA RUNOFF(CFS) = 14.36
EFFECTIVE AREA(ACRES) = 178.27   AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 194.8   PEAK FLOW RATE(CFS) = 245.54

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C-42

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*****
FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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

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=====
MAINLINE Tc(MIN.) = 16.24
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.643
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" B        0.10   0.30  0.900  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B        0.40   0.30  0.500  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B        0.10   0.30  0.500  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.567
SUBAREA AREA(ACRES) = 0.60   SUBAREA RUNOFF(CFS) = 0.80
EFFECTIVE AREA(ACRES) = 178.87   AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 195.4   PEAK FLOW RATE(CFS) = 246.34

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C-42

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*****
FLOW PROCESS FROM NODE 312.00 TO NODE 339.00 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) = 301.00
FLOW LENGTH(FEET) = 1370.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.6 INCHES
PIPE-VELOCITY(VELOCITY(VEET/SEC.) = 27.07
ESTIMATED PIPE DIAMETER(INCH) = 45.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 246.34
PIPE TRAVEL TIME(MIN.) = 0.84   Tc(MIN.) = 17.08

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LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

FLOW PROCESS FROM NODE 390.00 TO NODE 391.00 IS CODE = 21

>>>>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

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

SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.195

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.262

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"	B	0.20	0.30	1.000	72	9.20
NATURAL FAIR COVER						
"OPEN BRUSH"	B	1.20	0.30	1.000	66	9.20

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF (CFS) = 2.47

TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 2.47

OC-1

FLOW PROCESS FROM NODE 391.00 TO NODE 392.00 IS CODE = 51

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

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.057

OC-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					
"CHAPARRAL, NARROWLEAF"	B	1.70	0.30	1.000	72
NATURAL FAIR COVER					
"CHAPARRAL, NARROWLEAF"	B	0.60	0.30	1.000	72

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 4.29
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.38
AVERAGE FLOW DEPTH (FEET) = 0.52 TRAVEL TIME (MIN.) = 1.69
Tc (MIN.) = 10.88
SUBAREA AREA (ACRES) = 2.30 SUBAREA RUNOFF (CFS) = 3.64
EFFECTIVE AREA (ACRES) = 3.70 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 3.7 PEAK FLOW RATE (CFS) = 5.85

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.58 FLOW VELOCITY (FEET/SEC.) = 5.86
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 392.00 = 862.00 FEET.

FLOW PROCESS FROM NODE 392.00 TO NODE 393.00 IS CODE = 51

>>>>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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.786

OC-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					
"CHAPARRAL, BROADLEAF"	B	1.40	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL, NARROWLEAF"	B	8.40	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.70	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	0.40	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL, NARROWLEAF"	B	9.20	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 21.10

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.86

AVERAGE FLOW DEPTH (FEET) = 1.10 TRAVEL TIME (MIN.) = 3.11

Tc (MIN.) = 13.99

SUBAREA AREA (ACRES) = 22.70 SUBAREA RUNOFF (CFS) = 30.36

EFFECTIVE AREA (ACRES) = 26.40 AREA-AVERAGED Fm (INCH/HR) = 0.30

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 26.4 PEAK FLOW RATE (CFS) = 35.31

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 1.33 FLOW VELOCITY (FEET/SEC.) = 6.65

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

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.632

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	1.60	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	5.50	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.80	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.60	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	1.00	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	6.80	0.30	1.000	72

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 45.69

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.19

AVERAGE FLOW DEPTH(FEET) = 1.57 TRAVEL TIME (MIN.) = 2.43

Tc (MIN.) = 16.43

SUBAREA AREA (ACRES) = 17.30 SUBAREA RUNOFF (CFS) = 20.74

EFFECTIVE AREA (ACRES) = 43.70 AREA-AVERAGED Fm (INCH/HR) = 0.30

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 43.7 PEAK FLOW RATE (CFS) = 52.40

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 1.65 FLOW VELOCITY (FEET/SEC.) = 6.39

LONGEST FLOWPATH FROM NODE 390.00 TO NODE 394.00 = 2859.00 FEET.

OC-4

FLOW PROCESS FROM NODE 394.00 TO NODE 394.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 16.43

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.632

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	2.50	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.10	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA AREA (ACRES) = 2.60 SUBAREA RUNOFF (CFS) = 3.12

EFFECTIVE AREA (ACRES) = 46.30 AREA-AVERAGED Fm (INCH/HR) = 0.30

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 46.3 PEAK FLOW RATE (CFS) = 55.52

OC-4

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) = 664.00 CHANNEL SLOPE = 0.0377

CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000

MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.545

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	6.30	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	5.90	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	6.80	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.90	0.30	0.900	56

NATURAL FAIR COVER

"WOODLAND,GRASS"

NATURAL FAIR COVER

"CHAPARRAL,BROADLEAF" B 0.20 0.30 1.000 63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.996

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 67.08

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.59

AVERAGE FLOW DEPTH(FEET) = 1.84 TRAVEL TIME (MIN.) = 1.68

Tc (MIN.) = 18.11

SUBAREA AREA (ACRES) = 20.60 SUBAREA RUNOFF (CFS) = 23.12

EFFECTIVE AREA (ACRES) = 66.90 AREA-AVERAGED Fm (INCH/HR) = 0.30

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 66.9 PEAK FLOW RATE (CFS) = 75.01

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 1.92 FLOW VELOCITY (FEET/SEC.) = 6.78

LONGEST FLOWPATH FROM NODE 390.00 TO NODE 395.00 = 3523.00 FEET.

FLOW PROCESS FROM NODE 395.00 TO NODE 395.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 18.11

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.545

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"	B	12.60	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.10	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.40	0.30	0.900	56
NATURAL FAIR COVER					

OC-5

"WOODLAND,GRASS" B 0.10 0.30 1.000 65
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.987
 SUBAREA AREA (ACRES) = 18.20 SUBAREA RUNOFF (CFS) = 20.47
 EFFECTIVE AREA (ACRES) = 85.10 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 85.1 PEAK FLOW RATE (CFS) = 95.48

 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) = 389.00
 FLOW LENGTH (FEET) = 5717.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.3 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 18.00
 ESTIMATED PIPE DIAMETER (INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 95.48
 PIPE TRAVEL TIME (MIN.) = 5.29 Tc (MIN.) = 23.40
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 370.00 = 9240.00 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) = 389.00 DOWNSTREAM (FEET) = 345.00
 CHANNEL LENGTH THRU SUBAREA (FEET) = 1996.00 CHANNEL SLOPE = 0.0220
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 20.00
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.188

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	2.90	0.30	1.000	69
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	4.40	0.30	1.000	63
COMMERCIAL	B	0.50	0.30	0.100	56
NATURAL FAIR COVER					
"GRASS"	B	6.60	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.60	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	6.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.956
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 105.26
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.02
 AVERAGE FLOW DEPTH (FEET) = 2.41 TRAVEL TIME (MIN.) = 5.52
 Tc (MIN.) = 28.93
 SUBAREA AREA (ACRES) = 24.10 SUBAREA RUNOFF (CFS) = 19.54
 EFFECTIVE AREA (ACRES) = 109.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
 TOTAL AREA (ACRES) = 109.2 PEAK FLOW RATE (CFS) = 95.48

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 2.32 FLOW VELOCITY (FEET/SEC.) = 5.89
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 371.00 = 11236.00 FEET.

 FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 28.93
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.188
 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	1.10	0.30	1.000	63
COMMERCIAL	B	1.10	0.30	0.100	56
NATURAL FAIR COVER					
"GRASS"	B	2.00	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.40	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.830
 SUBAREA AREA (ACRES) = 7.10 SUBAREA RUNOFF (CFS) = 6.00
 EFFECTIVE AREA (ACRES) = 116.30 AREA-AVERAGED Fm (INCH/HR) = 0.29
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
 TOTAL AREA (ACRES) = 116.3 PEAK FLOW RATE (CFS) = 95.48
 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.) = 28.93
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.188
 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	0.70	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.20	0.30	1.000	65
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	3.00	0.30	1.000	65
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.40	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.975

SUBAREA AREA (ACRES) = 5.50 SUBAREA RUNOFF (CFS) = 4.43
EFFECTIVE AREA (ACRES) = 121.80 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
TOTAL AREA (ACRES) = 121.8 PEAK FLOW RATE (CFS) = 98.05

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 28.93
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.188 C-50

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" B 1.40 0.30 0.900 56
NATURAL FAIR COVER
"WOODLAND, GRASS" B 0.10 0.30 1.000 65

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.907
SUBAREA AREA (ACRES) = 1.50 SUBAREA RUNOFF (CFS) = 1.24
EFFECTIVE AREA (ACRES) = 123.30 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
TOTAL AREA (ACRES) = 123.3 PEAK FLOW RATE (CFS) = 99.29

FLOW PROCESS FROM NODE 371.00 TO NODE 372.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 345.00 DOWNSTREAM (FEET) = 301.00
FLOW LENGTH (FEET) = 488.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 26.72
ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 99.29
PIPE TRAVEL TIME (MIN.) = 0.30 Tc (MIN.) = 29.23
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 372.00 = 11724.00 FEET.

FLOW PROCESS FROM NODE 372.00 TO NODE 373.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM (FEET) = 301.00 DOWNSTREAM (FEET) = 300.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 924.00 CHANNEL SLOPE = 0.0011
GIVEN CHANNEL BASE (FEET) = 30.00 CHANNEL FREEBOARD (FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030

*ESTIMATED CHANNEL HEIGHT (FEET) = 2.67
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.040 C-60

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 32.30 0.30 0.100 56
COMMERCIAL B 2.70 0.30 0.100 56

COMMERCIAL B 0.60 0.30 0.100 56
COMMERCIAL B 1.80 0.30 0.100 56
PUBLIC PARK B 7.20 0.30 0.850 56
PUBLIC PARK B 9.80 0.30 0.850 56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.334
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 122.29
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 2.08
AVERAGE FLOW DEPTH (FEET) = 1.68 TRAVEL TIME (MIN.) = 7.39
Tc (MIN.) = 36.62

SUBAREA AREA (ACRES) = 54.40 SUBAREA RUNOFF (CFS) = 46.02
EFFECTIVE AREA (ACRES) = 177.70 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.78
TOTAL AREA (ACRES) = 177.7 PEAK FLOW RATE (CFS) = 128.95
GIVEN CHANNEL BASE (FEET) = 30.00 CHANNEL FREEBOARD (FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
*ESTIMATED CHANNEL HEIGHT (FEET) = 2.73

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.73 FLOW VELOCITY (FEET/SEC.) = 2.12
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 373.00 = 12648.00 FEET.

FLOW PROCESS FROM NODE 373.00 TO NODE 373.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 36.62
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.040 C-60

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

PUBLIC PARK B 2.60 0.30 0.850 56
PUBLIC PARK B 2.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.50 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.80 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.60 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.886
SUBAREA AREA (ACRES) = 17.40 SUBAREA RUNOFF (CFS) = 12.13
EFFECTIVE AREA (ACRES) = 195.10 AREA-AVERAGED Fm (INCH/HR) = 0.24
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.79
TOTAL AREA (ACRES) = 195.1 PEAK FLOW RATE (CFS) = 141.07

FLOW PROCESS FROM NODE 373.00 TO NODE 374.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 300.00 DOWNSTREAM (FEET) = 298.00
FLOW LENGTH (FEET) = 1188.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 54.1 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 6.45
 ESTIMATED PIPE DIAMETER (INCH) = 69.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 141.07
 PIPE TRAVEL TIME (MIN.) = 3.07 Tc (MIN.) = 39.69
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

 FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 10

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

 FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

 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) = 622.00 DOWNSTREAM (FEET) = 621.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 10.511
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.098

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.)
APARTMENTS	B	1.50	0.30	0.200	56	10.51
APARTMENTS	B	2.00	0.30	0.200	56	10.51

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA RUNOFF (CFS) = 6.42
 TOTAL AREA (ACRES) = 3.50 PEAK FLOW RATE (CFS) = 6.42

C-15

 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) = 621.00 DOWNSTREAM ELEVATION (FEET) = 612.00
 STREET LENGTH (FEET) = 569.00 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) = 10.71
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH (FEET) = 0.39
 HALFSTREET FLOOD WIDTH (FEET) = 13.01
 AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.14
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.24
 STREET FLOW TRAVEL TIME (MIN.) = 3.02 Tc (MIN.) = 13.53
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.820

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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
APARTMENTS	B	2.20	0.30	0.200	56
APARTMENTS	B	3.20	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA (ACRES) = 5.40 SUBAREA RUNOFF (CFS) = 8.56
 EFFECTIVE AREA (ACRES) = 8.90 AREA-AVERAGED Fm (INCH/HR) = 0.06
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.20
 TOTAL AREA (ACRES) = 8.9 PEAK FLOW RATE (CFS) = 14.10

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.42 HALFSTREET FLOOD WIDTH (FEET) = 14.65
 FLOW VELOCITY (FEET/SEC.) = 3.34 DEPTH*VELOCITY (FT*FT/SEC.) = 1.42
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 322.00 = 899.00 FEET.

 FLOW PROCESS FROM NODE 322.00 TO NODE 324.00 IS CODE = 62

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

UPSTREAM ELEVATION (FEET) = 612.00 DOWNSTREAM ELEVATION (FEET) = 590.00
 STREET LENGTH (FEET) = 891.00 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

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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) = 22.04
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH (FEET) = 0.45
 HALFSTREET FLOOD WIDTH (FEET) = 16.05
 AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.42
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.98
 STREET FLOW TRAVEL TIME (MIN.) = 3.36 Tc (MIN.) = 16.89
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.607

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	3.00	0.30	0.400	56

RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 5.70 0.30 0.400 56
 CONDOMINIUMS B 1.20 0.30 0.350 56
 PUBLIC PARK B 0.30 0.30 0.850 56
 PUBLIC PARK B 0.90 0.30 0.850 56
 COMMERCIAL B 0.80 0.30 0.100 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.420
 SUBAREA AREA (ACRES) = 11.90 SUBAREA RUNOFF (CFS) = 15.86
 EFFECTIVE AREA (ACRES) = 20.80 AREA-AVERAGED Fm (INCH/HR) = 0.10
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.33
 TOTAL AREA (ACRES) = 20.8 PEAK FLOW RATE (CFS) = 28.25

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.48 HALFSTREET FLOOD WIDTH (FEET) = 17.77
 FLOW VELOCITY (FEET/SEC.) = 4.69 DEPTH*VELOCITY (FT*FT/SEC.) = 2.25
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 324.00 = 1790.00 FEET.

 FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 16.89
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.607
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 1.70 0.30 0.100 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA (ACRES) = 1.70 SUBAREA RUNOFF (CFS) = 2.41
 EFFECTIVE AREA (ACRES) = 22.50 AREA-AVERAGED Fm (INCH/HR) = 0.09
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
 TOTAL AREA (ACRES) = 22.5 PEAK FLOW RATE (CFS) = 30.66

C-17

 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) = 590.00 DOWNSTREAM (FEET) = 575.00
 FLOW LENGTH (FEET) = 529.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.0 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 12.91
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 30.66
 PIPE TRAVEL TIME (MIN.) = 0.68 Tc (MIN.) = 17.58
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 325.00 = 2319.00 FEET.

 FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 17.58
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.572

C-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 0.50 0.30 0.100 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.30 0.30 0.600 56
 COMMERCIAL B 0.30 0.30 0.100 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 2.10 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.544
 SUBAREA AREA (ACRES) = 7.20 SUBAREA RUNOFF (CFS) = 9.13
 EFFECTIVE AREA (ACRES) = 29.70 AREA-AVERAGED Fm (INCH/HR) = 0.11
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA (ACRES) = 29.7 PEAK FLOW RATE (CFS) = 39.07

 FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 17.58
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.572
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 0.10 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.80 0.30 0.600 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 10.20 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.606
 SUBAREA AREA (ACRES) = 15.30 SUBAREA RUNOFF (CFS) = 19.14
 EFFECTIVE AREA (ACRES) = 45.00 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA (ACRES) = 45.0 PEAK FLOW RATE (CFS) = 58.21

C-18

 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) = 575.00 DOWNSTREAM (FEET) = 515.00
 FLOW LENGTH (FEET) = 284.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.8 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 32.20
 ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 58.21
 PIPE TRAVEL TIME (MIN.) = 0.15 Tc (MIN.) = 17.72
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 326.00 = 2603.00 FEET.

 FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.72 C-14
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.564
 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
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.80	0.30	0.900	56
COMMERCIAL	B	1.40	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.30	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.582
 SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 6.75
 EFFECTIVE AREA(ACRES) = 50.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 64.67

 FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.72 C-14
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.564
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.10	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.80	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.557
 SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 6.16
 EFFECTIVE AREA(ACRES) = 55.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 55.3 PEAK FLOW RATE(CFS) = 70.83

 FLOW PROCESS FROM NODE 326.00 TO NODE 333.00 IS CODE = 31

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

 ELEVATION DATA: UPSTREAM(FEET) = 515.00 DOWNSTREAM(FEET) = 500.00
 FLOW LENGTH(FEET) = 1644.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.26
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 70.83
 PIPE TRAVEL TIME(MIN.) = 2.67 Tc(MIN.) = 20.39
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

 FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.39 C-20
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.446
 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
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
COMMERCIAL	B	1.80	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
COMMERCIAL	B	5.60	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	4.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
 SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 16.92
 EFFECTIVE AREA(ACRES) = 69.70 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 69.7 PEAK FLOW RATE(CFS) = 81.84

 FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.39 C-20
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.446
 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	0.20	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.23
 EFFECTIVE AREA(ACRES) = 69.90 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 69.9 PEAK FLOW RATE(CFS) = 82.07

 FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 1

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

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 20.39
 RAINFALL INTENSITY(INCH/HR) = 1.45
 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.47
 EFFECTIVE STREAM AREA(ACRES) = 69.90

TOTAL STREAM AREA (ACRES) = 69.90
PEAK FLOW RATE (CFS) AT CONFLUENCE = 82.07

FLOW PROCESS FROM NODE 327.00 TO NODE 327.50 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) = 615.00 DOWNSTREAM (FEET) = 614.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.844
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.177

C-21

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	0.40	0.30	0.100	56	9.84
PUBLIC PARK	B	0.20	0.30	0.850	56	15.64
RESIDENTIAL						
"8-10 DWELLINGS/ACRE"	B	0.10	0.30	0.400	56	12.11
COMMERCIAL	B	0.10	0.30	0.100	56	9.84
PUBLIC PARK	B	0.10	0.30	0.850	56	15.64

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.383

SUBAREA RUNOFF (CFS) = 1.67

TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 1.67

FLOW PROCESS FROM NODE 327.50 TO NODE 328.00 IS CODE = 62

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

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

UPSTREAM ELEVATION (FEET) = 614.00 DOWNSTREAM ELEVATION (FEET) = 610.00
STREET LENGTH (FEET) = 425.00 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

C-21.1

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL (DECIMAL) = 0.020

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

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

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 4.18

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.33

HALFSTREET FLOOD WIDTH (FEET) = 9.53

AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.08

PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 0.69

STREET FLOW TRAVEL TIME (MIN.) = 3.40 Tc (MIN.) = 13.25

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.842

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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LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	B	1.00	0.30	0.100	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
COMMERCIAL	B	0.90	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.348					
SUBAREA AREA (ACRES) = 3.20		SUBAREA RUNOFF (CFS) = 5.00			
EFFECTIVE AREA (ACRES) = 4.10		AREA-AVERAGED Fm (INCH/HR) = 0.11			
AREA-AVERAGED Fp (INCH/HR) = 0.30		AREA-AVERAGED Ap = 0.36			
TOTAL AREA (ACRES) = 4.1		PEAK FLOW RATE (CFS) = 6.40			

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.37 HALFSTREET FLOOD WIDTH (FEET) = 11.60

FLOW VELOCITY (FEET/SEC.) = 2.29 DEPTH*VELOCITY (FT*FT/SEC.) = 0.85

LONGEST FLOWPATH FROM NODE 327.00 TO NODE 328.00 = 754.00 FEET.

FLOW PROCESS FROM NODE 328.00 TO NODE 329.00 IS CODE = 62

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

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

UPSTREAM ELEVATION (FEET) = 610.00 DOWNSTREAM ELEVATION (FEET) = 595.00
STREET LENGTH (FEET) = 366.00 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

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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) = 11.01

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.35

HALFSTREET FLOOD WIDTH (FEET) = 10.66

AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.55

PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.61

STREET FLOW TRAVEL TIME (MIN.) = 1.34 Tc (MIN.) = 14.59

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.745

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.10	0.30	0.400	56
COMMERCIAL	B	0.50	0.30	0.100	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					

"8-10 DWELLINGS/ACRE" B 2.10 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
 SUBAREA AREA (ACRES) = 6.30 SUBAREA RUNOFF (CFS) = 9.20
 EFFECTIVE AREA (ACRES) = 10.40 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA (ACRES) = 10.4 PEAK FLOW RATE (CFS) = 15.25

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.38 HALFSTREET FLOOD WIDTH (FEET) = 12.30
 FLOW VELOCITY (FEET/SEC.) = 4.93 DEPTH*VELOCITY (FT*FT/SEC.) = 1.89
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 329.00 = 1120.00 FEET.

 FLOW PROCESS FROM NODE 329.00 TO NODE 329.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 14.59
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.745

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	2.80	0.30	0.400	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	6.10	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.402
 SUBAREA AREA (ACRES) = 9.00 SUBAREA RUNOFF (CFS) = 13.16
 EFFECTIVE AREA (ACRES) = 19.40 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA (ACRES) = 19.4 PEAK FLOW RATE (CFS) = 28.40

C-23

 FLOW PROCESS FROM NODE 329.00 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) = 595.00 DOWNSTREAM (FEET) = 575.00
 FLOW LENGTH (FEET) = 378.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.5 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 16.05
 ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 28.40
 PIPE TRAVEL TIME (MIN.) = 0.39 Tc (MIN.) = 14.98
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 330.00 = 1498.00 FEET.

 FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 14.98
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.719

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.90	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.50	0.30	0.400	56
COMMERCIAL	B	0.60	0.30	0.100	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	10.20	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.90	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.561
 SUBAREA AREA (ACRES) = 19.20 SUBAREA RUNOFF (CFS) = 26.80
 EFFECTIVE AREA (ACRES) = 38.60 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 38.6 PEAK FLOW RATE (CFS) = 54.75

C-24

 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) = 575.00 DOWNSTREAM (FEET) = 555.00
 FLOW LENGTH (FEET) = 457.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.9 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 17.47
 ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 54.75
 PIPE TRAVEL TIME (MIN.) = 0.44 Tc (MIN.) = 15.42
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 331.00 = 1955.00 FEET.

 FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 15.42
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.692

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.10	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.80	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	10.50	0.30	0.600	56
COMMERCIAL	B	0.30	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	13.70	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.619
 SUBAREA AREA (ACRES) = 26.90 SUBAREA RUNOFF (CFS) = 36.46

C-25

EFFECTIVE AREA(ACRES) = 65.50 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 65.5 PEAK FLOW RATE(CFS) = 90.26

FLOW PROCESS FROM NODE 331.00 TO NODE 332.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 555.00 DOWNSTREAM(FEET) = 520.00
 FLOW LENGTH(FEET) = 324.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 27.60
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 90.26
 PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 15.61
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 332.00 = 2279.00 FEET.

FLOW PROCESS FROM NODE 332.00 TO NODE 332.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.61
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.680

C-26

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 0.10 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.10 0.30 0.900 56
 COMMERCIAL B 3.70 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 5.00 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.621
 SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 14.65
 EFFECTIVE AREA(ACRES) = 76.40 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
 TOTAL AREA(ACRES) = 76.4 PEAK FLOW RATE(CFS) = 104.21

FLOW PROCESS FROM NODE 332.00 TO NODE 333.00 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) = 500.00
 FLOW LENGTH(FEET) = 1740.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.49
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 104.21
 PIPE TRAVEL TIME(MIN.) = 2.32 Tc(MIN.) = 17.93
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 333.00 = 4019.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.93
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.554

C-27

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 1.20 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 4.40 0.30 0.900 56
 COMMERCIAL B 3.90 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 9.80 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.689
 SUBAREA AREA(ACRES) = 19.30 SUBAREA RUNOFF(CFS) = 23.40
 EFFECTIVE AREA(ACRES) = 95.70 AREA-AVERAGED Fm(INCH/HR) = 0.17
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.58
 TOTAL AREA(ACRES) = 95.7 PEAK FLOW RATE(CFS) = 118.95

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 17.93
 RAINFALL INTENSITY(INCH/HR) = 1.55
 AREA-AVERAGED Fm(INCH/HR) = 0.17
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.58
 EFFECTIVE STREAM AREA(ACRES) = 95.70
 TOTAL STREAM AREA(ACRES) = 95.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 118.95

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	82.07	20.39	1.446	0.30(0.14)	0.47	69.9	320.00
2	118.95	17.93	1.554	0.30(0.17)	0.58	95.7	327.00

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	197.11	17.93	1.554	0.30(0.16)	0.53	157.2	327.00
2	191.69	20.39	1.446	0.30(0.16)	0.53	165.6	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 197.11 Tc(MIN.) = 17.93
 EFFECTIVE AREA(ACRES) = 157.17 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53

TOTAL AREA (ACRES) = 165.6
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 334.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM (FEET) =	500.00	DOWNSTREAM (FEET) =	468.00
FLOW LENGTH (FEET) =	819.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS	32.4	INCHES	
PIPE-FLOW VELOCITY (FEET/SEC.) =	23.13		
ESTIMATED PIPE DIAMETER (INCH) =	45.00	NUMBER OF PIPES =	1
PIPE-FLOW (CFS) =	197.11		
PIPE TRAVEL TIME (MIN.) =	0.59	Tc (MIN.) =	18.52
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 =	5066.00	FEET.	

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 18.52
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.526

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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
APARTMENTS	B	4.00	0.30	0.200	56
COMMERCIAL	B	2.30	0.30	0.100	56
COMMERCIAL	B	1.00	0.30	0.100	56
PUBLIC PARK	B	0.40	0.30	0.850	56
PUBLIC PARK	B	2.40	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.50	0.30	0.200	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.310
SUBAREA AREA (ACRES) = 13.60 SUBAREA RUNOFF (CFS) = 17.54
EFFECTIVE AREA (ACRES) = 170.77 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA (ACRES) = 179.2 PEAK FLOW RATE (CFS) = 210.69

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 18.52
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.526

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	2.00	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.60	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.10	0.30	0.400	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA (ACRES) = 5.70 SUBAREA RUNOFF (CFS) = 7.32
EFFECTIVE AREA (ACRES) = 176.47 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA (ACRES) = 184.9 PEAK FLOW RATE (CFS) = 218.01

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 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.) = 18.52
RAINFALL INTENSITY (INCH/HR) = 1.53
AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.51
EFFECTIVE STREAM AREA (ACRES) = 176.47
TOTAL STREAM AREA (ACRES) = 184.90
PEAK FLOW RATE (CFS) AT CONFLUENCE = 218.01

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FLOW PROCESS FROM NODE 350.00 TO NODE 351.00 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) = 495.00 DOWNSTREAM (FEET) = 492.00

Tc = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 10.730
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.074
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						
"3-4 DWELLINGS/ACRE"	B	0.80	0.30	0.600	56	10.73
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.70	0.30	0.600	56	10.73

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA RUNOFF (CFS) = 4.26
TOTAL AREA (ACRES) = 2.50 PEAK FLOW RATE (CFS) = 4.26

FLOW PROCESS FROM NODE 351.00 TO NODE 352.00 IS CODE = 62

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

=====

UPSTREAM ELEVATION (FEET) = 492.00 DOWNSTREAM ELEVATION (FEET) = 488.00
STREET LENGTH (FEET) = 456.00 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

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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) = 6.86
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.38
HALFSTREET FLOOD WIDTH(FEET) = 12.15
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.27
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.86
STREET FLOW TRAVEL TIME(MIN.) = 3.35 Tc(MIN.) = 14.08

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.780
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" B 3.20 0.30 0.600 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.40 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 5.18
EFFECTIVE AREA(ACRES) = 6.10 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 6.1 PEAK FLOW RATE(CFS) = 8.78

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.40 HALFSTREET FLOOD WIDTH(FEET) = 13.55
FLOW VELOCITY(FEET/SEC.) = 2.39 DEPTH*VELOCITY(FT*FT/SEC.) = 0.97
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 352.00 = 786.00 FEET.

FLOW PROCESS FROM NODE 352.00 TO NODE 353.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 488.00 DOWNSTREAM(FEET) = 485.00
FLOW LENGTH(FEET) = 883.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.31
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.78
PIPE TRAVEL TIME(MIN.) = 3.41 Tc(MIN.) = 17.49
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 353.00 = 1669.00 FEET.

FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.49
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.576
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.50 0.30 0.600 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 1.10 0.30 0.400 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.60 0.30 0.600 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 4.50 0.30 0.400 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.70 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.471
SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 10.97
EFFECTIVE AREA(ACRES) = 14.60 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 18.63

FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.49
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.576
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 0.30 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.39
EFFECTIVE AREA(ACRES) = 14.90 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.9 PEAK FLOW RATE(CFS) = 19.03

FLOW PROCESS FROM NODE 353.00 TO NODE 334.00 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) = 468.00
FLOW LENGTH(FEET) = 1136.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.11
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.03
PIPE TRAVEL TIME(MIN.) = 2.08 Tc(MIN.) = 19.57
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 334.00 = 2805.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

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=====
MAINLINE Tc(MIN.) = 19.57
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.479
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B         0.90   0.30  0.100  56
PUBLIC PARK         B         2.00   0.30  0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B         1.40   0.30  0.200  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B         1.50   0.30  0.400  56
COMMERCIAL          B         0.50   0.30  0.100  56
PUBLIC PARK         B         1.50   0.30  0.850  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 9.31
EFFECTIVE AREA(ACRES) = 22.70 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 22.7 PEAK FLOW RATE(CFS) = 27.04

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*****
FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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=====
MAINLINE Tc(MIN.) = 19.57
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.479
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         3.10   0.30  0.200  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B         1.40   0.30  0.400  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 5.67
EFFECTIVE AREA(ACRES) = 27.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 27.2 PEAK FLOW RATE(CFS) = 32.71

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*****
FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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=====
MAINLINE Tc(MIN.) = 19.57
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.479
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK         B         0.50   0.30  0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B         0.10   0.30  0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B         1.20   0.30  0.600  56
PUBLIC PARK         B         2.70   0.30  0.850  56

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RESIDENTIAL
".4 DWELLING/ACRE" B         0.20   0.30  0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B         7.30   0.30  0.600  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.674
SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 13.79
EFFECTIVE AREA(ACRES) = 39.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 39.2 PEAK FLOW RATE(CFS) = 46.51

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*****
FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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=====
MAINLINE Tc(MIN.) = 19.57
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.479
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B         0.10   0.30  0.100  56
PUBLIC PARK         B         0.60   0.30  0.850  56
SCHOOL              B         3.10   0.30  0.600  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.626
SUBAREA AREA(ACRES) = 3.80 SUBAREA RUNOFF(CFS) = 4.42
EFFECTIVE AREA(ACRES) = 43.00 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 43.0 PEAK FLOW RATE(CFS) = 50.92

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*****
FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 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.) = 19.57
RAINFALL INTENSITY(INCH/HR) = 1.48
AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.54
EFFECTIVE STREAM AREA(ACRES) = 43.00
TOTAL STREAM AREA(ACRES) = 43.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 50.92

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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	218.01	18.52	1.526	0.30(0.15)	0.51	176.5	327.00
1	211.31	20.99	1.422	0.30(0.15)	0.51	184.9	320.00
2	50.92	19.57	1.479	0.30(0.16)	0.54	43.0	350.00

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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	267.91	18.52	1.526	0.30 (0.16)	0.52	217.2	327.00
2	266.08	19.57	1.479	0.30 (0.15)	0.52	223.1	350.00
3	260.04	20.99	1.422	0.30 (0.15)	0.52	227.9	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 267.91 Tc(MIN.) = 18.52
 EFFECTIVE AREA(ACRES) = 217.16 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 227.9
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 335.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 468.00 DOWNSTREAM(FEET) = 422.00
 FLOW LENGTH(FEET) = 1086.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 25.41
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 267.91
 PIPE TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 19.24
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 335.00 = 6152.00 FEET.

FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.24
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.494

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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	B	3.00	0.30	0.100	56
COMMERCIAL	B	4.20	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
PUBLIC PARK	B	10.80	0.30	0.850	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.00	0.30	0.900	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	3.90	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.631
 SUBAREA AREA(ACRES) = 23.50 SUBAREA RUNOFF(CFS) = 27.59
 EFFECTIVE AREA(ACRES) = 240.66 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 251.4 PEAK FLOW RATE(CFS) = 289.24

FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.24
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.494

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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					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	9.20	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.70	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.90	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.474
 SUBAREA AREA(ACRES) = 13.10 SUBAREA RUNOFF(CFS) = 15.94
 EFFECTIVE AREA(ACRES) = 253.76 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 264.5 PEAK FLOW RATE(CFS) = 305.18

FLOW PROCESS FROM NODE 335.00 TO NODE 336.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 422.00 DOWNSTREAM(FEET) = 380.00
 FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.66
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 305.18
 PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 19.69
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 336.00 = 6932.00 FEET.

FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.69
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.474

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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	B	0.70	0.30	0.100	56
COMMERCIAL	B	0.60	0.30	0.100	56
COMMERCIAL	B	1.60	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.70	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.60	0.30	0.200	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.182
 SUBAREA AREA(ACRES) = 12.30 SUBAREA RUNOFF(CFS) = 15.72
 EFFECTIVE AREA(ACRES) = 266.06 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 276.8 PEAK FLOW RATE(CFS) = 316.46

 FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.69
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.474 **C-33**

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.50	0.30	0.900	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.40	0.30	0.600	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	16.80	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.70	0.30	0.400	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.611
 SUBAREA AREA(ACRES) = 22.20 SUBAREA RUNOFF(CFS) = 25.79
 EFFECTIVE AREA(ACRES) = 288.26 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 299.0 PEAK FLOW RATE(CFS) = 342.25

 FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.69
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.474 **C-33**

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	6.30	0.30	0.400	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
 SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 7.68
 EFFECTIVE AREA(ACRES) = 294.56 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 305.3 PEAK FLOW RATE(CFS) = 349.93

 FLOW PROCESS FROM NODE 336.00 TO NODE 337.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 380.00 DOWNSTREAM(FEET) = 350.00
 FLOW LENGTH(FEET) = 803.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 42.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 25.83
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 349.93
 PIPE TRAVEL TIME(MIN.) = 0.52 Tc(MIN.) = 20.21
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 337.00 = 7735.00 FEET.

 FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.21
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.453 **C-36**

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	0.40	0.30	0.200	56
APARTMENTS	B	3.00	0.30	0.200	56
COMMERCIAL	B	1.30	0.30	0.100	56
COMMERCIAL	B	2.70	0.30	0.100	56
COMMERCIAL	B	6.00	0.30	0.100	56
PUBLIC PARK	B	1.30	0.30	0.850	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.189
 SUBAREA AREA(ACRES) = 14.70 SUBAREA RUNOFF(CFS) = 18.47
 EFFECTIVE AREA(ACRES) = 309.26 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 320.0 PEAK FLOW RATE(CFS) = 362.74

 FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.21
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.453 **C-36**

SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	3.30	0.30	0.850	56
PUBLIC PARK	B	1.50	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.50	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	6.70	0.30	0.200	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.488
 SUBAREA AREA(ACRES) = 16.30 SUBAREA RUNOFF(CFS) = 19.17

EFFECTIVE AREA (ACRES) = 325.56 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 336.3 PEAK FLOW RATE (CFS) = 381.90

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 20.21
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.453
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" B 0.60 0.30 0.600 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 4.60 0.30 0.400 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 2.90 0.30 0.400 56
SCHOOL B 0.20 0.30 0.600 56
SCHOOL B 5.90 0.30 0.600 56
SCHOOL B 6.00 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.526
SUBAREA AREA (ACRES) = 20.20 SUBAREA RUNOFF (CFS) = 23.55
EFFECTIVE AREA (ACRES) = 345.76 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 356.5 PEAK FLOW RATE (CFS) = 405.45

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FLOW PROCESS FROM NODE 337.00 TO NODE 338.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 350.00 DOWNSTREAM (FEET) = 332.00
FLOW LENGTH (FEET) = 838.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 50.7 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 21.72
ESTIMATED PIPE DIAMETER (INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 405.45
PIPE TRAVEL TIME (MIN.) = 0.64 Tc (MIN.) = 20.85
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 338.00 = 8573.00 FEET.

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 20.85
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.428
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 6.90 0.30 0.200 56
COMMERCIAL B 1.40 0.30 0.100 56
COMMERCIAL B 1.90 0.30 0.100 56

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COMMERCIAL B 5.90 0.30 0.100 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 3.60 0.30 0.200 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.154
SUBAREA AREA (ACRES) = 19.80 SUBAREA RUNOFF (CFS) = 24.62
EFFECTIVE AREA (ACRES) = 365.56 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA (ACRES) = 376.3 PEAK FLOW RATE (CFS) = 422.18

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 20.85
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.428
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 1.60 0.30 0.200 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA (ACRES) = 1.60 SUBAREA RUNOFF (CFS) = 1.97
EFFECTIVE AREA (ACRES) = 367.16 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA (ACRES) = 377.9 PEAK FLOW RATE (CFS) = 424.15

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 20.85
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.428
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 2.10 0.30 0.100 56
COMMERCIAL B 8.50 0.30 0.100 56
COMMERCIAL B 1.90 0.30 0.100 56
COMMERCIAL B 0.70 0.30 0.100 56
PUBLIC PARK B 2.60 0.30 0.850 56
PUBLIC PARK B 0.60 0.30 0.850 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.246
SUBAREA AREA (ACRES) = 16.40 SUBAREA RUNOFF (CFS) = 19.98
EFFECTIVE AREA (ACRES) = 383.56 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA (ACRES) = 394.3 PEAK FLOW RATE (CFS) = 444.13

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 20.85
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.428 **C-41**
 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 0.20 0.30 0.200 56
 COMMERCIAL B 6.20 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.00 0.30 0.200 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.70 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.132
 SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 11.37
 EFFECTIVE AREA(ACRES) = 392.66 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 403.4 PEAK FLOW RATE(CFS) = 455.50

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 20.85
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.428 **C-41**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 0.70 0.30 0.100 56
 COMMERCIAL B 1.70 0.30 0.100 56
 COMMERCIAL B 0.80 0.30 0.100 56
 COMMERCIAL B 2.00 0.30 0.100 56
 PUBLIC PARK B 0.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.116
 SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 6.77
 EFFECTIVE AREA(ACRES) = 398.06 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 408.8 PEAK FLOW RATE(CFS) = 462.27

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 20.85
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.428 **C-41**
 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 0.10 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200

SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.12
 EFFECTIVE AREA(ACRES) = 398.16 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 408.9 PEAK FLOW RATE(CFS) = 462.39

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 20.85
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.428 **C-58**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 1.30 0.30 0.100 56
 COMMERCIAL B 0.10 0.30 0.100 56
 COMMERCIAL B 1.10 0.30 0.100 56
 SCHOOL B 0.20 0.30 0.600 56
 SCHOOL B 0.50 0.30 0.600 56
 SCHOOL B 1.20 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.316
 SUBAREA AREA(ACRES) = 4.40 SUBAREA RUNOFF(CFS) = 5.28
 EFFECTIVE AREA(ACRES) = 402.56 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 413.3 PEAK FLOW RATE(CFS) = 467.67

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 20.85
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.428 **C-58**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 4.40 0.30 0.100 56
 COMMERCIAL B 3.50 0.30 0.100 56
 COMMERCIAL B 4.70 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.30 0.30 0.200 56
 SCHOOL B 0.60 0.30 0.600 56
 SCHOOL B 0.60 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.145
 SUBAREA AREA(ACRES) = 14.10 SUBAREA RUNOFF(CFS) = 17.57
 EFFECTIVE AREA(ACRES) = 416.66 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 427.4 PEAK FLOW RATE(CFS) = 485.24

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 20.85

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* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.428
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 SCHOOL B 3.30 0.30 0.600 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 3.71
 EFFECTIVE AREA(ACRES) = 419.96 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 430.7 PEAK FLOW RATE(CFS) = 488.94

 FLOW PROCESS FROM NODE 338.00 TO NODE 339.00 IS CODE = 31

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

C-58

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ELEVATION DATA: UPSTREAM(FEET) = 332.00 DOWNSTREAM(FEET) = 301.00
 FLOW LENGTH(FEET) = 1956.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 72.0 INCH PIPE IS 57.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.38
 ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 488.94
 PIPE TRAVEL TIME(MIN.) = 1.60 Tc(MIN.) = 22.45
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

 FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 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	488.94	22.45	1.370	0.30(0.13)	0.45	420.0	327.00
2	480.82	23.50	1.335	0.30(0.13)	0.45	425.9	350.00
3	467.60	24.93	1.291	0.30(0.13)	0.45	430.7	320.00

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 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	246.34	17.08	1.597	0.30(0.11)	0.38	178.9	300.00
2	192.48	28.86	1.189	0.30(0.12)	0.39	195.4	306.00

LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	686.79	17.08	1.597	0.30(0.13)	0.42	498.3	300.00
2	710.73	22.45	1.370	0.30(0.13)	0.43	606.4	327.00
3	697.80	23.50	1.335	0.30(0.13)	0.43	613.7	350.00
4	678.08	24.93	1.291	0.30(0.13)	0.43	620.6	320.00
5	618.76	28.86	1.189	0.30(0.13)	0.43	626.1	306.00

TOTAL AREA(ACRES) = 626.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 710.73 Tc(MIN.) = 22.450
 EFFECTIVE AREA(ACRES) = 606.36 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 626.1
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

 FLOW PROCESS FROM NODE 339.00 TO NODE 340.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 301.00 DOWNSTREAM(FEET) = 300.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 196.00 CHANNEL SLOPE = 0.0051
 GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.80
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.334

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SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 31.90 0.30 0.100 56
 COMMERCIAL B 2.30 0.30 0.100 56
 COMMERCIAL B 1.90 0.30 0.100 56
 COMMERCIAL B 1.00 0.30 0.100 56
 PUBLIC PARK B 3.10 0.30 0.850 56
 PUBLIC PARK B 0.80 0.30 0.850 56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.171
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 734.40
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.04
 AVERAGE FLOW DEPTH(FEET) = 0.80 TRAVEL TIME(MIN.) = 1.07
 Tc(MIN.) = 23.52

SUBAREA AREA(ACRES) = 41.00 SUBAREA RUNOFF(CFS) = 47.33
 EFFECTIVE AREA(ACRES) = 647.36 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 667.1 PEAK FLOW RATE(CFS) = 710.73
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
 GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.78

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.78 FLOW VELOCITY(FEET/SEC.) = 3.00
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 340.00 = 10725.00 FEET.

 FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 23.52
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.334
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 RESIDENTIAL

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" .4 DWELLING/ACRE" B 4.00 0.30 0.900 56
 RESIDENTIAL
 " .4 DWELLING/ACRE" B 1.80 0.30 0.900 56
 RESIDENTIAL
 " .4 DWELLING/ACRE" B 2.40 0.30 0.900 56
 PUBLIC PARK B 0.10 0.30 0.850 56
 PUBLIC PARK B 0.10 0.30 0.850 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.899
 SUBAREA AREA(ACRES) = 8.40 SUBAREA RUNOFF(CFS) = 8.05
 EFFECTIVE AREA(ACRES) = 655.76 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 675.5 PEAK FLOW RATE(CFS) = 713.59

 FLOW PROCESS FROM NODE 340.00 TO NODE 374.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 300.00 DOWNSTREAM(FEET) = 298.00
 FLOW LENGTH(FEET) = 221.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 93.0 INCH PIPE IS 71.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.23
 ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 713.59
 PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 23.73
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 374.00 = 10946.00 FEET.

 FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 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	Ae (ACRES)	HEADWATER NODE
1	699.74	18.37	1.533	0.30(0.12)	0.41	547.7	300.00
2	713.59	23.73	1.328	0.30(0.12)	0.42	655.8	327.00
3	701.94	24.79	1.295	0.30(0.13)	0.42	663.1	350.00
4	684.35	26.23	1.255	0.30(0.13)	0.42	670.0	320.00
5	631.04	30.21	1.159	0.30(0.13)	0.42	675.5	306.00

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 374.00 = 10946.00 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	141.07	39.69	0.994	0.30(0.24)	0.79	195.1	390.00

LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	811.48	18.37	1.533	0.30(0.14)	0.46	638.0	300.00
2	835.04	23.73	1.328	0.30(0.14)	0.47	772.4	327.00
3	825.07	24.79	1.295	0.30(0.14)	0.48	785.0	350.00
4	809.67	26.23	1.255	0.30(0.14)	0.48	798.9	320.00

5 761.79 30.21 1.159 0.30(0.15) 0.49 824.0 306.00
 6 671.52 39.69 0.994 0.30(0.15) 0.50 870.6 390.00
 TOTAL AREA(ACRES) = 870.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 835.04 Tc(MIN.) = 23.726
 EFFECTIVE AREA(ACRES) = 772.39 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 870.6
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

 FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 12

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

 FLOW PROCESS FROM NODE 374.00 TO NODE 380.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 298.00 DOWNSTREAM(FEET) = 261.00
 FLOW LENGTH(FEET) = 1402.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 81.0 INCH PIPE IS 62.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.37
 ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 835.04
 PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 24.55
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 380.00 = 15238.00 FEET.

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 870.6 TC(MIN.) = 24.55
 EFFECTIVE AREA(ACRES) = 772.39 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.473
 PEAK FLOW RATE(CFS) = 835.04

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	811.48	19.20	1.496	0.30(0.14)	0.46	638.0	300.00
2	835.04	24.55	1.302	0.30(0.14)	0.47	772.4	327.00
3	825.07	25.61	1.272	0.30(0.14)	0.48	785.0	350.00
4	809.67	27.06	1.233	0.30(0.14)	0.48	798.9	320.00
5	761.79	31.06	1.141	0.30(0.15)	0.49	824.0	306.00
6	671.52	40.56	0.982	0.30(0.15)	0.50	870.6	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 SUBAREA C ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 25-YR EV DECEMBER 2018 CCHIUI *

FILE NAME: PA3C25EV.DAT
TIME/DATE OF STUDY: 09:22 12/19/2018

=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====

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

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

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

Table with columns: NO., HALF WIDTH (FT), CROWN CROSSFALL (FT), STREET IN- / OUT- / PARK- SIDE / SIDE / WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GEOMETRIES LIP (FT), MANNING HIKE (FT), FACTOR (n)

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) = 320.00
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.) = 6.766
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.414

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Table with columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.)

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) = 634.00 DOWNSTREAM ELEVATION(FEET) = 630.00
STREET LENGTH(FEET) = 503.00 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

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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) = 21.15
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.52
HALFSTREET FLOOD WIDTH(FEET) = 19.88
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.84
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.47
STREET FLOW TRAVEL TIME(MIN.) = 2.95 Tc(MIN.) = 9.72
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.774

Table with columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 23.09
 FLOW VELOCITY(FEET/SEC.) = 3.11 DEPTH*VELOCITY(FT*FT/SEC.) = 1.79
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 823.00 FEET.

 FLOW PROCESS FROM NODE 302.00 TO NODE 302.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 9.72
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.774
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.00	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	9.30	0.30	0.200	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.30	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.276
 SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 29.06
 EFFECTIVE AREA(ACRES) = 25.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 25.3 PEAK FLOW RATE(CFS) = 59.86

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 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) = 630.00 DOWNSTREAM(FEET) = 625.00
 FLOW LENGTH(FEET) = 651.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.33
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 59.86
 PIPE TRAVEL TIME(MIN.) = 1.16 Tc(MIN.) = 10.88
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1474.00 FEET.

 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.88
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.600
 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
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.80	0.30	0.400	56

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SCHOOL B 1.30 0.30 0.600 56
 COMMERCIAL B 0.60 0.30 0.100 56
 PUBLIC PARK B 0.60 0.30 0.850 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.480
 SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 11.27
 EFFECTIVE AREA(ACRES) = 30.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 30.4 PEAK FLOW RATE(CFS) = 67.17

 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.88
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.600
 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
SCHOOL	B	5.20	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.50	0.30	0.400	56
SCHOOL	B	5.20	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.50	0.30	0.400	56
SCHOOL	B	5.20	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.50	0.30	0.400	56
SCHOOL	B	5.20	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.520
 SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 19.14
 EFFECTIVE AREA(ACRES) = 39.10 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 39.1 PEAK FLOW RATE(CFS) = 86.31

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 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.88
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.600
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.80	0.30	0.100	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	7.40	0.30	0.200	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.50	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.215
 SUBAREA AREA(ACRES) = 11.40 SUBAREA RUNOFF(CFS) = 26.01
 EFFECTIVE AREA(ACRES) = 50.50 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA(ACRES) = 50.5 PEAK FLOW RATE(CFS) = 112.32

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 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

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=====
MAINLINE Tc(MIN.) = 10.88
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.600
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL          B        4.70    0.30    0.100    56
PUBLIC PARK         B        2.30    0.30    0.850    56
RESIDENTIAL
"11+ DWELLINGS/ACRE"  B        4.90    0.30    0.200    56
COMMERCIAL          B        1.70    0.30    0.100    56
PUBLIC PARK         B        1.80    0.30    0.850    56
RESIDENTIAL
"11+ DWELLINGS/ACRE"  B        6.20    0.30    0.200    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.294
SUBAREA AREA(ACRES) = 21.60      SUBAREA RUNOFF(CFS) = 48.83
EFFECTIVE AREA(ACRES) = 72.10    AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 72.1        PEAK FLOW RATE(CFS) = 161.14

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FLOW PROCESS FROM NODE 303.00 TO NODE 305.00 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) = 625.00 DOWNSTREAM(FEET) = 615.00
FLOW LENGTH(FEET) = 1029.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 39.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.04
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 161.14
PIPE TRAVEL TIME(MIN.) = 1.32 Tc(MIN.) = 12.20
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 305.00 = 2503.00 FEET.

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*****
FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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=====
MAINLINE Tc(MIN.) = 12.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.435
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL          B        2.10    0.30    0.100    56
PUBLIC PARK         B        1.80    0.30    0.850    56
RESIDENTIAL
"11+ DWELLINGS/ACRE"  B        1.00    0.30    0.200    56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B        5.00    0.30    0.400    56
COMMERCIAL          B        2.80    0.30    0.100    56
PUBLIC PARK         B        0.90    0.30    0.850    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.367
SUBAREA AREA(ACRES) = 13.60      SUBAREA RUNOFF(CFS) = 28.46
EFFECTIVE AREA(ACRES) = 85.70    AREA-AVERAGED Fm(INCH/HR) = 0.12

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C-7

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AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 85.7        PEAK FLOW RATE(CFS) = 178.93

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*****
FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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=====
MAINLINE Tc(MIN.) = 12.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.435
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        1.80    0.30    0.200    56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B        1.20    0.30    0.400    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.280
SUBAREA AREA(ACRES) = 3.00      SUBAREA RUNOFF(CFS) = 6.35
EFFECTIVE AREA(ACRES) = 88.70    AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 88.7        PEAK FLOW RATE(CFS) = 185.28

```

C-7

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*****
FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1
-----

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

```

```

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 12.20
RAINFALL INTENSITY(INCH/HR) = 2.44
AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.38
EFFECTIVE STREAM AREA(ACRES) = 88.70
TOTAL STREAM AREA(ACRES) = 88.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 185.28

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*****
FLOW PROCESS FROM NODE 306.00 TO NODE 307.00 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) = 317.00
ELEVATION DATA: UPSTREAM(FEET) = 646.00 DOWNSTREAM(FEET) = 645.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.296
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.139
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.)
PUBLIC PARK         B        0.40    0.30    0.850    56   15.30
RESIDENTIAL
".4 DWELLING/ACRE"  B        0.10    0.30    0.900    56   15.42

```

C-8

PUBLIC PARK B 1.50 0.30 0.850 56 15.30
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.20 0.30 0.900 56 15.42
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.857
 SUBAREA RUNOFF(CFS) = 3.73
 TOTAL AREA (ACRES) = 2.20 PEAK FLOW RATE (CFS) = 3.73

 FLOW PROCESS FROM NODE 307.00 TO NODE 307.10 IS CODE = 62

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

=====

UPSTREAM ELEVATION(FEET) = 645.00 DOWNSTREAM ELEVATION(FEET) = 641.00
 STREET LENGTH(FEET) = 375.00 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

C-8.1

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) = 7.06
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.37
 HALFSTREET FLOOD WIDTH(FEET) = 11.84
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.44
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.91
 STREET FLOW TRAVEL TIME(MIN.) = 2.56 Tc(MIN.) = 17.85
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.958
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.00	0.30	0.600	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.40	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.649
 SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 6.66
 EFFECTIVE AREA(ACRES) = 6.40 AREA-AVERAGED Fm(INCH/HR) = 0.22
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.72
 TOTAL AREA(ACRES) = 6.4 PEAK FLOW RATE(CFS) = 10.03

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 13.79
 FLOW VELOCITY(FEET/SEC.) = 2.65 DEPTH*VELOCITY(FT*FT/SEC.) = 1.08
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 307.10 = 692.00 FEET.

 FLOW PROCESS FROM NODE 307.10 TO NODE 308.00 IS CODE = 62

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

=====

UPSTREAM ELEVATION(FEET) = 641.00 DOWNSTREAM ELEVATION(FEET) = 635.00
 STREET LENGTH(FEET) = 506.00 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

C-9

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) = 16.30
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.46
 HALFSTREET FLOOD WIDTH(FEET) = 16.52
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.10
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.42
 STREET FLOW TRAVEL TIME(MIN.) = 2.72 Tc(MIN.) = 20.58
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.805
 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
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.80	0.30	0.600	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.30	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.554
 SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 12.54
 EFFECTIVE AREA(ACRES) = 14.90 AREA-AVERAGED Fm(INCH/HR) = 0.19
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.63
 TOTAL AREA(ACRES) = 14.9 PEAK FLOW RATE(CFS) = 21.69

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49 HALFSTREET FLOOD WIDTH(FEET) = 18.55
 FLOW VELOCITY(FEET/SEC.) = 3.32 DEPTH*VELOCITY(FT*FT/SEC.) = 1.64
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 308.00 = 1198.00 FEET.

 FLOW PROCESS FROM NODE 308.00 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) = 635.00 DOWNSTREAM(FEET) = 615.00
 FLOW LENGTH(FEET) = 1516.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.5 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 8.85
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 21.69
 PIPE TRAVEL TIME (MIN.) = 2.85 Tc (MIN.) = 23.43
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.43
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.675 C-10

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.20	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.20	0.30	0.200	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.80	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.50	0.30	0.400	56
SCHOOL	B	0.20	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.289
 SUBAREA AREA (ACRES) = 5.00 SUBAREA RUNOFF (CFS) = 7.15
 EFFECTIVE AREA (ACRES) = 19.90 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 19.9 PEAK FLOW RATE (CFS) = 27.10

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.43
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.675 C-10

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.20	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.30	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.00	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	6.60	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.415
 SUBAREA AREA (ACRES) = 14.60 SUBAREA RUNOFF (CFS) = 20.38
 EFFECTIVE AREA (ACRES) = 34.50 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49

TOTAL AREA (ACRES) = 34.5 PEAK FLOW RATE (CFS) = 47.48

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.43
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.675 C-10

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
SCHOOL	B	0.20	0.30	0.600	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600					
SUBAREA AREA (ACRES) = 0.20			SUBAREA RUNOFF (CFS) = 0.27		
EFFECTIVE AREA (ACRES) = 34.70			AREA-AVERAGED Fm (INCH/HR) = 0.15		
AREA-AVERAGED Fp (INCH/HR) = 0.30			AREA-AVERAGED Ap = 0.49		
TOTAL AREA (ACRES) = 34.7			PEAK FLOW RATE (CFS) = 47.75		

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION (MIN.) = 23.43
 RAINFALL INTENSITY (INCH/HR) = 1.68
 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.49
 EFFECTIVE STREAM AREA (ACRES) = 34.70
 TOTAL STREAM AREA (ACRES) = 34.70
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 47.75

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	185.28	12.20	2.435	0.30 (0.11)	0.38	88.7	300.00
2	47.75	23.43	1.675	0.30 (0.15)	0.49	34.7	306.00

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 (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	222.49	12.20	2.435	0.30 (0.12)	0.40	106.8	300.00
2	172.36	23.43	1.675	0.30 (0.12)	0.41	123.4	306.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE (CFS) = 222.49 Tc (MIN.) = 12.20
 EFFECTIVE AREA (ACRES) = 106.76 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
 TOTAL AREA (ACRES) = 123.4
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

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*****
FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 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) = 480.00
FLOW LENGTH(FEET) = 2954.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.16
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 222.49
PIPE TRAVEL TIME(MIN.) = 1.96 Tc(MIN.) = 14.15
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 310.00 = 5668.00 FEET.
```

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*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 14.15
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.236
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 4.80 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.40 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.20 0.30 0.600 56
COMMERCIAL B 2.30 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.164
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 15.35
EFFECTIVE AREA(ACRES) = 114.56 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 131.2 PEAK FLOW RATE(CFS) = 222.49
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 14.15
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.236
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.10 0.30 0.100 56
PUBLIC PARK B 0.20 0.30 0.850 56
PUBLIC PARK B 2.30 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 6.40 0.30 0.200 56
RESIDENTIAL
```

```
"11+ DWELLINGS/ACRE" B 2.60 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.70 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.371
SUBAREA AREA(ACRES) = 12.30 SUBAREA RUNOFF(CFS) = 23.52
EFFECTIVE AREA(ACRES) = 126.86 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 143.5 PEAK FLOW RATE(CFS) = 242.24
```

```
*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 14.15
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.236
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" B 2.20 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 0.80 0.30 0.500 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 10.20 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 2.50 0.30 0.400 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 3.70 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.514
SUBAREA AREA(ACRES) = 19.50 SUBAREA RUNOFF(CFS) = 36.54
EFFECTIVE AREA(ACRES) = 146.36 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 163.0 PEAK FLOW RATE(CFS) = 278.78
```

```
*****
FLOW PROCESS FROM NODE 310.00 TO NODE 311.00 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) = 430.00
FLOW LENGTH(FEET) = 1056.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.83
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 278.78
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 14.81
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 311.00 = 6724.00 FEET.
```

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*****
FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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C-11

C-12

C-12

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=====
MAINLINE Tc(MIN.) = 14.81
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.179
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B        1.60   0.30  0.100  56
COMMERCIAL          B        3.60   0.30  0.100  56
PUBLIC PARK         B        0.10   0.30  0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        3.90   0.30  0.200  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        5.10   0.30  0.200  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        0.80   0.30  0.600  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.191
SUBAREA AREA(ACRES) = 15.10   SUBAREA RUNOFF(CFS) = 28.83
EFFECTIVE AREA(ACRES) = 161.46   AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 178.1   PEAK FLOW RATE(CFS) = 300.06

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C-13

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*****
FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.81
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.179
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" B        6.70   0.30  0.600  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 6.70   SUBAREA RUNOFF(CFS) = 12.05
EFFECTIVE AREA(ACRES) = 168.16   AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 184.8   PEAK FLOW RATE(CFS) = 312.12

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C-13

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*****
FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 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) = 430.00   DOWNSTREAM(FEET) = 373.00
FLOW LENGTH(FEET) = 1373.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.19
ESTIMATED PIPE DIAMETER(INCH) = 51.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 312.12
PIPE TRAVEL TIME(MIN.) = 0.87   Tc(MIN.) = 15.68
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 312.00 = 8097.00 FEET.

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*****
FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.68
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.109
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B        1.50   0.30  0.100  56
COMMERCIAL          B        4.50   0.30  0.100  56
APARTMENTS          B        3.40   0.30  0.200  56
COMMERCIAL          B        0.30   0.30  0.100  56
PUBLIC PARK         B        0.10   0.30  0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B        0.20   0.30  0.900  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.157
SUBAREA AREA(ACRES) = 10.00   SUBAREA RUNOFF(CFS) = 18.55
EFFECTIVE AREA(ACRES) = 178.16   AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 194.8   PEAK FLOW RATE(CFS) = 320.01

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C-42

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*****
FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.68
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.109
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" B        0.10   0.30  0.900  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B        0.40   0.30  0.500  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B        0.10   0.30  0.500  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.567
SUBAREA AREA(ACRES) = 0.60   SUBAREA RUNOFF(CFS) = 1.05
EFFECTIVE AREA(ACRES) = 178.76   AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 195.4   PEAK FLOW RATE(CFS) = 321.06

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C-42

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*****
FLOW PROCESS FROM NODE 312.00 TO NODE 339.00 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) = 373.00   DOWNSTREAM(FEET) = 301.00
FLOW LENGTH(FEET) = 1370.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 36.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 29.18
ESTIMATED PIPE DIAMETER(INCH) = 51.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 321.06
PIPE TRAVEL TIME(MIN.) = 0.78   Tc(MIN.) = 16.47

```

LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

FLOW PROCESS FROM NODE 390.00 TO NODE 391.00 IS CODE = 21

>>>>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

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

SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.195

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.863

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"	B	0.20	0.30	1.000	72	9.20
NATURAL FAIR COVER						
"OPEN BRUSH"	B	1.20	0.30	1.000	66	9.20

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF (CFS) = 3.23

TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 3.23

OC-1

FLOW PROCESS FROM NODE 391.00 TO NODE 392.00 IS CODE = 51

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

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
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.616

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"	B	1.70	0.30	1.000	72
NATURAL FAIR COVER					
"CHAPARRAL, NARROWLEAF"	B	0.60	0.30	1.000	72

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

OC-2

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 5.63
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.79
AVERAGE FLOW DEPTH (FEET) = 0.57 TRAVEL TIME (MIN.) = 1.57
Tc (MIN.) = 10.77
SUBAREA AREA (ACRES) = 2.30 SUBAREA RUNOFF (CFS) = 4.79
EFFECTIVE AREA (ACRES) = 3.70 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 3.7 PEAK FLOW RATE (CFS) = 7.71

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.64 FLOW VELOCITY (FEET/SEC.) = 6.20
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 392.00 = 862.00 FEET.

FLOW PROCESS FROM NODE 392.00 TO NODE 393.00 IS CODE = 51

>>>>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
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.283

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	1.40	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL, NARROWLEAF"	B	8.40	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.70	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	0.40	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL, NARROWLEAF"	B	9.20	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 28.04

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.30

AVERAGE FLOW DEPTH (FEET) = 1.22 TRAVEL TIME (MIN.) = 2.89

Tc (MIN.) = 13.66

SUBAREA AREA (ACRES) = 22.70 SUBAREA RUNOFF (CFS) = 40.51

EFFECTIVE AREA (ACRES) = 26.40 AREA-AVERAGED Fm (INCH/HR) = 0.30

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 26.4 PEAK FLOW RATE (CFS) = 47.11

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.48 FLOW VELOCITY (FEET/SEC.) = 7.14
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<<<<<

OC-3

>>>>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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.090
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	1.60	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	5.50	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.80	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.60	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	1.00	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	6.80	0.30	1.000	72

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 61.05
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.65
AVERAGE FLOW DEPTH(FEET) = 1.75 TRAVEL TIME(MIN.) = 2.27
Tc(MIN.) = 15.92
SUBAREA AREA(ACRES) = 17.30 SUBAREA RUNOFF(CFS) = 27.88
EFFECTIVE AREA(ACRES) = 43.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 43.7 PEAK FLOW RATE(CFS) = 70.42

OC-4

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.85 FLOW VELOCITY(FEET/SEC.) = 6.86
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.) = 15.92
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.090
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	2.50	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.10	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 4.19
EFFECTIVE AREA(ACRES) = 46.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 46.3 PEAK FLOW RATE(CFS) = 74.60

OC-4

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) = 664.00 CHANNEL SLOPE = 0.0377
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.982
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	6.30	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	5.90	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	6.80	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.90	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.50	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	0.20	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.996
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 90.21
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.11
AVERAGE FLOW DEPTH(FEET) = 2.06 TRAVEL TIME(MIN.) = 1.56
Tc(MIN.) = 17.48
SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 31.20
EFFECTIVE AREA(ACRES) = 66.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 66.9 PEAK FLOW RATE(CFS) = 101.27

OC-5

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.15 FLOW VELOCITY(FEET/SEC.) = 7.31
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 395.00 = 3523.00 FEET.

FLOW PROCESS FROM NODE 395.00 TO NODE 395.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 17.48
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.982
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"	B	12.60	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.10	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.40	0.30	0.900	56

NATURAL FAIR COVER

OC-5

"WOODLAND,GRASS" B 0.10 0.30 1.000 65
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.987
 SUBAREA AREA (ACRES) = 18.20 SUBAREA RUNOFF (CFS) = 27.61
 EFFECTIVE AREA (ACRES) = 85.10 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 85.1 PEAK FLOW RATE (CFS) = 128.88

 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) = 389.00
 FLOW LENGTH (FEET) = 5717.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 19.21
 ESTIMATED PIPE DIAMETER (INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 128.88
 PIPE TRAVEL TIME (MIN.) = 4.96 Tc (MIN.) = 22.44
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 370.00 = 9240.00 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) = 389.00 DOWNSTREAM (FEET) = 345.00
 CHANNEL LENGTH THRU SUBAREA (FEET) = 1996.00 CHANNEL SLOPE = 0.0220
 CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.527

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	2.90	0.30	1.000	69
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	4.40	0.30	1.000	63
COMMERCIAL	B	0.50	0.30	0.100	56
NATURAL FAIR COVER					
"GRASS"	B	6.60	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.60	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	6.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.956
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 142.34
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.52
 AVERAGE FLOW DEPTH (FEET) = 2.70 TRAVEL TIME (MIN.) = 5.10
 Tc (MIN.) = 27.54
 SUBAREA AREA (ACRES) = 24.10 SUBAREA RUNOFF (CFS) = 26.90
 EFFECTIVE AREA (ACRES) = 109.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
 TOTAL AREA (ACRES) = 109.2 PEAK FLOW RATE (CFS) = 128.88

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 2.60 FLOW VELOCITY (FEET/SEC.) = 6.33
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 371.00 = 11236.00 FEET.

 FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

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

=====

MAINLINE Tc (MIN.) = 27.54
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.527 **C-50**
 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	1.10	0.30	1.000	63
COMMERCIAL	B	1.10	0.30	0.100	56
NATURAL FAIR COVER					
"GRASS"	B	2.00	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.40	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.830
 SUBAREA AREA (ACRES) = 7.10 SUBAREA RUNOFF (CFS) = 8.17
 EFFECTIVE AREA (ACRES) = 116.30 AREA-AVERAGED Fm (INCH/HR) = 0.29
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
 TOTAL AREA (ACRES) = 116.3 PEAK FLOW RATE (CFS) = 129.14

 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.) = 27.54
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.527 **C-50**
 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	0.70	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.20	0.30	1.000	65
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	3.00	0.30	1.000	65
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.40	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.975
 SUBAREA AREA (ACRES) = 5.50 SUBAREA RUNOFF (CFS) = 6.11

EFFECTIVE AREA (ACRES) = 121.80 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
TOTAL AREA (ACRES) = 121.8 PEAK FLOW RATE (CFS) = 135.25

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 27.54
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.527
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" B 1.40 0.30 0.900 56
NATURAL FAIR COVER
"WOODLAND, GRASS" B 0.10 0.30 1.000 65
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.907
SUBAREA AREA (ACRES) = 1.50 SUBAREA RUNOFF (CFS) = 1.69
EFFECTIVE AREA (ACRES) = 123.30 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
TOTAL AREA (ACRES) = 123.3 PEAK FLOW RATE (CFS) = 136.94

C-50

FLOW PROCESS FROM NODE 371.00 TO NODE 372.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 345.00 DOWNSTREAM (FEET) = 301.00
FLOW LENGTH (FEET) = 488.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.7 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 28.74
ESTIMATED PIPE DIAMETER (INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 136.94
PIPE TRAVEL TIME (MIN.) = 0.28 Tc (MIN.) = 27.83
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 372.00 = 11724.00 FEET.

FLOW PROCESS FROM NODE 372.00 TO NODE 373.00 IS CODE = 56

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

>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM (FEET) = 301.00 DOWNSTREAM (FEET) = 300.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 924.00 CHANNEL SLOPE = 0.0011
GIVEN CHANNEL BASE (FEET) = 30.00 CHANNEL FREEBOARD (FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
*ESTIMATED CHANNEL HEIGHT (FEET) = 3.00
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.342

C-60

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 32.30 0.30 0.100 56
COMMERCIAL B 2.70 0.30 0.100 56
COMMERCIAL B 0.60 0.30 0.100 56

COMMERCIAL B 1.80 0.30 0.100 56
PUBLIC PARK B 7.20 0.30 0.850 56
PUBLIC PARK B 9.80 0.30 0.850 56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.334
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 167.36
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 2.31
AVERAGE FLOW DEPTH (FEET) = 2.01 TRAVEL TIME (MIN.) = 6.66
Tc (MIN.) = 34.49

SUBAREA AREA (ACRES) = 54.40 SUBAREA RUNOFF (CFS) = 60.82
EFFECTIVE AREA (ACRES) = 177.70 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.78
TOTAL AREA (ACRES) = 177.7 PEAK FLOW RATE (CFS) = 177.27
GIVEN CHANNEL BASE (FEET) = 30.00 CHANNEL FREEBOARD (FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
*ESTIMATED CHANNEL HEIGHT (FEET) = 3.07

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 2.07 FLOW VELOCITY (FEET/SEC.) = 2.36
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 373.00 = 12648.00 FEET.

FLOW PROCESS FROM NODE 373.00 TO NODE 373.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 34.49
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.342
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 2.60 0.30 0.850 56
PUBLIC PARK B 2.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.50 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.80 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.60 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.886
SUBAREA AREA (ACRES) = 17.40 SUBAREA RUNOFF (CFS) = 16.86
EFFECTIVE AREA (ACRES) = 195.10 AREA-AVERAGED Fm (INCH/HR) = 0.24
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.79
TOTAL AREA (ACRES) = 195.1 PEAK FLOW RATE (CFS) = 194.13

C-60

FLOW PROCESS FROM NODE 373.00 TO NODE 374.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 300.00 DOWNSTREAM (FEET) = 298.00
FLOW LENGTH (FEET) = 1188.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 60.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 7.00

ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 194.13
PIPE TRAVEL TIME(MIN.) = 2.83 Tc(MIN.) = 37.32
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

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) = 622.00 DOWNSTREAM(FEET) = 621.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.511
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.652

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.)
APARTMENTS	B	1.50	0.30	0.200	56	10.51
APARTMENTS	B	2.00	0.30	0.200	56	10.51

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200

SUBAREA RUNOFF(CFS) = 8.16

TOTAL AREA(ACRES) = 3.50 PEAK FLOW RATE(CFS) = 8.16

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) = 621.00 DOWNSTREAM ELEVATION(FEET) = 612.00
STREET LENGTH(FEET) = 569.00 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) = 13.64

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.42

HALFSTREET FLOOD WIDTH(FEET) = 14.41

AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.33

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.40

STREET FLOW TRAVEL TIME(MIN.) = 2.85 Tc(MIN.) = 13.36

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.312

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	2.20	0.30	0.200	56
APARTMENTS	B	3.20	0.30	0.200	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200

SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 10.94

EFFECTIVE AREA(ACRES) = 8.90 AREA-AVERAGED Fm(INCH/HR) = 0.06

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.20

TOTAL AREA(ACRES) = 8.9 PEAK FLOW RATE(CFS) = 18.03

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.45 HALFSTREET FLOOD WIDTH(FEET) = 16.21

FLOW VELOCITY(FEET/SEC.) = 3.55 DEPTH*VELOCITY(FT*FT/SEC.) = 1.60

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 322.00 = 899.00 FEET.

FLOW PROCESS FROM NODE 322.00 TO NODE 324.00 IS CODE = 62

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

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

UPSTREAM ELEVATION(FEET) = 612.00 DOWNSTREAM ELEVATION(FEET) = 590.00
STREET LENGTH(FEET) = 891.00 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) = 28.33

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.48

HALFSTREET FLOOD WIDTH(FEET) = 17.77

AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.70

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.26

STREET FLOW TRAVEL TIME(MIN.) = 3.16 Tc(MIN.) = 16.52

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.047

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	3.00	0.30	0.400	56

RESIDENTIAL

C-16

C-17

C-15

"8-10 DWELLINGS/ACRE" B 5.70 0.30 0.400 56
 CONDOMINIUMS B 1.20 0.30 0.350 56
 PUBLIC PARK B 0.30 0.30 0.850 56
 PUBLIC PARK B 0.90 0.30 0.850 56
 COMMERCIAL B 0.80 0.30 0.100 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.420
 SUBAREA AREA(ACRES) = 11.90 SUBAREA RUNOFF(CFS) = 20.57
 EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.33
 TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 36.48

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 19.73
 FLOW VELOCITY(FEET/SEC.) = 4.97 DEPTH*VELOCITY(FT*FT/SEC.) = 2.56
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 324.00 = 1790.00 FEET.

 FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 16.52
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.047 C-17
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 1.70 0.30 0.100 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.70 SUBAREA RUNOFF(CFS) = 3.09
 EFFECTIVE AREA(ACRES) = 22.50 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
 TOTAL AREA(ACRES) = 22.5 PEAK FLOW RATE(CFS) = 39.57

 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) = 590.00 DOWNSTREAM(FEET) = 575.00
 FLOW LENGTH(FEET) = 529.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.82
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 39.57
 PIPE TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 17.16
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 325.00 = 2319.00 FEET.

 FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 17.16 C-18
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.003
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 0.50 0.30 0.100 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.30 0.30 0.600 56
 COMMERCIAL B 0.30 0.30 0.100 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 2.10 0.30 0.600 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.544
 SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 11.92
 EFFECTIVE AREA(ACRES) = 29.70 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 29.7 PEAK FLOW RATE(CFS) = 50.60

 FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

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

 MAINLINE Tc(MIN.) = 17.16
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.003 C-18
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 0.10 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.80 0.30 0.600 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 10.20 0.30 0.600 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.606
 SUBAREA AREA(ACRES) = 15.30 SUBAREA RUNOFF(CFS) = 25.08
 EFFECTIVE AREA(ACRES) = 45.00 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 45.0 PEAK FLOW RATE(CFS) = 75.68

 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) = 575.00 DOWNSTREAM(FEET) = 515.00
 FLOW LENGTH(FEET) = 284.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 34.61
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 75.68
 PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 17.29
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 326.00 = 2603.00 FEET.

 FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 17.29

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.994 **C-14**

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
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.80	0.30	0.900	56
COMMERCIAL	B	1.40	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.30	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.582

SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 8.84

EFFECTIVE AREA(ACRES) = 50.40 AREA-AVERAGED Fm(INCH/HR) = 0.14

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46

TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 84.15

FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 17.29

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.994 **C-14**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.10	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.80	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.557

SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 8.06

EFFECTIVE AREA(ACRES) = 55.30 AREA-AVERAGED Fm(INCH/HR) = 0.14

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47

TOTAL AREA(ACRES) = 55.3 PEAK FLOW RATE(CFS) = 92.20

FLOW PROCESS FROM NODE 326.00 TO NODE 333.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM(FEET) = 515.00 DOWNSTREAM(FEET) = 500.00

FLOW LENGTH(FEET) = 1644.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 11.12

ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 92.20

PIPE TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 19.76

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.76

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.847 **C-20**

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
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
COMMERCIAL	B	1.80	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
COMMERCIAL	B	5.60	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	4.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467

SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 22.13

EFFECTIVE AREA(ACRES) = 69.70 AREA-AVERAGED Fm(INCH/HR) = 0.14

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47

TOTAL AREA(ACRES) = 69.7 PEAK FLOW RATE(CFS) = 107.04

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.76

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.847 **C-20**

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	0.20	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600

SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.30

EFFECTIVE AREA(ACRES) = 69.90 AREA-AVERAGED Fm(INCH/HR) = 0.14

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47

TOTAL AREA(ACRES) = 69.9 PEAK FLOW RATE(CFS) = 107.34

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 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.) = 19.76

RAINFALL INTENSITY(INCH/HR) = 1.85

AREA-AVERAGED Fm(INCH/HR) = 0.14

AREA-AVERAGED Fp(INCH/HR) = 0.30

AREA-AVERAGED Ap = 0.47

EFFECTIVE STREAM AREA(ACRES) = 69.90

TOTAL STREAM AREA(ACRES) = 69.90

PEAK FLOW RATE(CFS) AT CONFLUENCE = 107.34

FLOW PROCESS FROM NODE 327.00 TO NODE 327.50 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) = 615.00 DOWNSTREAM(FEET) = 614.00

Tc = K*(LENGTH** 3.00)/(ELEVATION CHANGE)**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.844
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.753
SUBAREA Tc AND LOSS RATE DATA(AMC II):

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include COMMERCIAL, PUBLIC PARK, RESIDENTIAL, and "8-10 DWELLINGS/ACRE".

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.383
SUBAREA RUNOFF(CFS) = 2.14
TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 2.14

FLOW PROCESS FROM NODE 327.50 TO NODE 328.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 614.00 DOWNSTREAM ELEVATION(FEET) = 610.00
STREET LENGTH(FEET) = 425.00 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) = 5.37
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 10.74
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.19
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.78
STREET FLOW TRAVEL TIME(MIN.) = 3.23 Tc(MIN.) = 13.07

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.340
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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C-21.1

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include COMMERCIAL, PUBLIC PARK, RESIDENTIAL, and "8-10 DWELLINGS/ACRE".

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 13.01
FLOW VELOCITY(FEET/SEC.) = 2.42 DEPTH*VELOCITY(FT*FT/SEC.) = 0.95
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 328.00 = 754.00 FEET.

FLOW PROCESS FROM NODE 328.00 TO NODE 329.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 610.00 DOWNSTREAM ELEVATION(FEET) = 595.00
STREET LENGTH(FEET) = 366.00 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) = 14.19
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.38
HALFSTREET FLOOD WIDTH(FEET) = 11.91
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.86
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.82
STREET FLOW TRAVEL TIME(MIN.) = 1.26 Tc(MIN.) = 14.33
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.220

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include COMMERCIAL, PUBLIC PARK, RESIDENTIAL, and "8-10 DWELLINGS/ACRE".

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 11.90
EFFECTIVE AREA(ACRES) = 10.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 10.4 PEAK FLOW RATE(CFS) = 19.70

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 13.79
FLOW VELOCITY(FEET/SEC.) = 5.21 DEPTH*VELOCITY(FT*FT/SEC.) = 2.13
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 329.00 = 1120.00 FEET.

FLOW PROCESS FROM NODE 329.00 TO NODE 329.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.33
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.220
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	2.80	0.30	0.400	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	6.10	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.402
SUBAREA AREA(ACRES) = 9.00 SUBAREA RUNOFF(CFS) = 17.01
EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 36.71

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FLOW PROCESS FROM NODE 329.00 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) = 595.00 DOWNSTREAM(FEET) = 575.00
FLOW LENGTH(FEET) = 378.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.21
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 36.71
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 14.70
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 330.00 = 1498.00 FEET.

FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.70
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.189
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.90	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.50	0.30	0.400	56
COMMERCIAL	B	0.60	0.30	0.100	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	10.20	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.90	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.561
SUBAREA AREA(ACRES) = 19.20 SUBAREA RUNOFF(CFS) = 34.91
EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 71.06

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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) = 575.00 DOWNSTREAM(FEET) = 555.00
FLOW LENGTH(FEET) = 457.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.69
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 71.06
PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 15.10
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 331.00 = 1955.00 FEET.

FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.10
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.155
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.10	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.80	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	10.50	0.30	0.600	56
COMMERCIAL	B	0.30	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	13.70	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.619
SUBAREA AREA(ACRES) = 26.90 SUBAREA RUNOFF(CFS) = 47.67
EFFECTIVE AREA(ACRES) = 65.50 AREA-AVERAGED Fm(INCH/HR) = 0.16

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AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA (ACRES) = 65.5 PEAK FLOW RATE (CFS) = 117.54

FLOW PROCESS FROM NODE 331.00 TO NODE 332.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 555.00 DOWNSTREAM (FEET) = 520.00
FLOW LENGTH (FEET) = 324.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.7 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 29.56
ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 117.54
PIPE TRAVEL TIME (MIN.) = 0.18 Tc (MIN.) = 15.29
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 332.00 = 2279.00 FEET.

FLOW PROCESS FROM NODE 332.00 TO NODE 332.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 15.29
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.140

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	2.10	0.30	0.900	56
COMMERCIAL	B	3.70	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	5.00	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.621
SUBAREA AREA (ACRES) = 10.90 SUBAREA RUNOFF (CFS) = 19.16
EFFECTIVE AREA (ACRES) = 76.40 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
TOTAL AREA (ACRES) = 76.4 PEAK FLOW RATE (CFS) = 135.84

FLOW PROCESS FROM NODE 332.00 TO NODE 333.00 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) = 500.00
FLOW LENGTH (FEET) = 1740.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.6 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 13.20
ESTIMATED PIPE DIAMETER (INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 135.84
PIPE TRAVEL TIME (MIN.) = 2.20 Tc (MIN.) = 17.48
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 333.00 = 4019.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 17.48

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.981

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.20	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	4.40	0.30	0.900	56
COMMERCIAL	B	3.90	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	9.80	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.689
SUBAREA AREA (ACRES) = 19.30 SUBAREA RUNOFF (CFS) = 30.83
EFFECTIVE AREA (ACRES) = 95.70 AREA-AVERAGED Fm (INCH/HR) = 0.17
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.58
TOTAL AREA (ACRES) = 95.7 PEAK FLOW RATE (CFS) = 155.77

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 17.48
RAINFALL INTENSITY (INCH/HR) = 1.98
AREA-AVERAGED Fm (INCH/HR) = 0.17
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.58
EFFECTIVE STREAM AREA (ACRES) = 95.70
TOTAL STREAM AREA (ACRES) = 95.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 155.77

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	107.34	19.76	1.847	0.30 (0.14)	0.47	69.9	320.00
2	155.77	17.48	1.981	0.30 (0.17)	0.58	95.7	327.00

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	258.21	17.48	1.981	0.30 (0.16)	0.53	157.5	327.00
2	251.55	19.76	1.847	0.30 (0.16)	0.53	165.6	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 258.21 Tc (MIN.) = 17.48
EFFECTIVE AREA (ACRES) = 157.55 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA (ACRES) = 165.6

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LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 334.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 500.00 DOWNSTREAM(FEET) = 468.00
FLOW LENGTH(FEET) = 819.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.41
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 258.21
PIPE TRAVEL TIME(MIN.) = 0.56 Tc(MIN.) = 18.04
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.04
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.946

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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 APARTMENTS, COMMERCIAL, PUBLIC PARK, RESIDENTIAL.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.310
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 22.68
EFFECTIVE AREA(ACRES) = 171.15 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 179.2 PEAK FLOW RATE(CFS) = 275.87

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 18.04
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.946

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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.

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA(ACRES) = 5.70 SUBAREA RUNOFF(CFS) = 9.48
EFFECTIVE AREA(ACRES) = 176.85 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 184.9 PEAK FLOW RATE(CFS) = 285.35

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 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.) = 18.04
RAINFALL INTENSITY(INCH/HR) = 1.95
AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.51
EFFECTIVE STREAM AREA(ACRES) = 176.85
TOTAL STREAM AREA(ACRES) = 184.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 285.35

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FLOW PROCESS FROM NODE 350.00 TO NODE 351.00 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) = 495.00 DOWNSTREAM(FEET) = 492.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.730
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.621
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
"3-4 DWELLINGS/ACRE" B 0.80 0.30 0.600 56 10.73
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.70 0.30 0.600 56 10.73
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA RUNOFF(CFS) = 5.49
TOTAL AREA(ACRES) = 2.50 PEAK FLOW RATE(CFS) = 5.49

FLOW PROCESS FROM NODE 351.00 TO NODE 352.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 492.00 DOWNSTREAM ELEVATION(FEET) = 488.00
STREET LENGTH(FEET) = 456.00 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

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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) = 8.87
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 13.63
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.39
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.97
STREET FLOW TRAVEL TIME(MIN.) = 3.18 Tc(MIN.) = 13.91

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.259
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" B 3.20 0.30 0.600 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.40 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 6.74
EFFECTIVE AREA(ACRES) = 6.10 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 6.1 PEAK FLOW RATE(CFS) = 11.41

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 15.12
FLOW VELOCITY(FEET/SEC.) = 2.55 DEPTH*VELOCITY(FT*FT/SEC.) = 1.10
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 352.00 = 786.00 FEET.

FLOW PROCESS FROM NODE 352.00 TO NODE 353.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 488.00 DOWNSTREAM(FEET) = 485.00
FLOW LENGTH(FEET) = 883.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.51
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.41
PIPE TRAVEL TIME(MIN.) = 3.26 Tc(MIN.) = 17.17
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 353.00 = 1669.00 FEET.

FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 17.17
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.002
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" B 0.50 0.30 0.600 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 1.10 0.30 0.400 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.60 0.30 0.600 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 4.50 0.30 0.400 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.70 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.471
SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 14.24
EFFECTIVE AREA(ACRES) = 14.60 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 24.24

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FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 17.17
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.002
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.30 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.51
EFFECTIVE AREA(ACRES) = 14.90 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.9 PEAK FLOW RATE(CFS) = 24.75

FLOW PROCESS FROM NODE 353.00 TO NODE 334.00 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) = 468.00
FLOW LENGTH(FEET) = 1136.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.50
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.75
PIPE TRAVEL TIME(MIN.) = 1.99 Tc(MIN.) = 19.16
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 334.00 = 2805.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.16
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.880 C-48

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.90 0.30 0.100 56
PUBLIC PARK B 2.00 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 1.40 0.30 0.200 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 1.50 0.30 0.400 56
COMMERCIAL B 0.50 0.30 0.100 56
PUBLIC PARK B 1.50 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 12.12
EFFECTIVE AREA(ACRES) = 22.70 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 22.7 PEAK FLOW RATE(CFS) = 35.23

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.16
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.880 C-48

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 3.10 0.30 0.200 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 1.40 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 7.30
EFFECTIVE AREA(ACRES) = 27.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 27.2 PEAK FLOW RATE(CFS) = 42.52

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.16
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.880 C-49

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 0.50 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.20 0.30 0.600 56
PUBLIC PARK B 2.70 0.30 0.850 56
RESIDENTIAL

"4 DWELLING/ACRE" B 0.20 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 7.30 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.674
SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 18.12
EFFECTIVE AREA(ACRES) = 39.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 39.2 PEAK FLOW RATE(CFS) = 60.64

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.16
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.880 C-49

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.10 0.30 0.100 56
PUBLIC PARK B 0.60 0.30 0.850 56
SCHOOL B 3.10 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.626
SUBAREA AREA(ACRES) = 3.80 SUBAREA RUNOFF(CFS) = 5.79
EFFECTIVE AREA(ACRES) = 43.00 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 43.0 PEAK FLOW RATE(CFS) = 66.43

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 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.) = 19.16
RAINFALL INTENSITY(INCH/HR) = 1.88
AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.54
EFFECTIVE STREAM AREA(ACRES) = 43.00
TOTAL STREAM AREA(ACRES) = 43.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 66.43

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	285.35	18.04	1.946	0.30(0.15)	0.51	176.8	327.00
1	277.11	20.32	1.818	0.30(0.15)	0.51	184.9	320.00
2	66.43	19.16	1.880	0.30(0.16)	0.54	43.0	350.00

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	350.30	18.04	1.946	0.30(0.16)	0.52	217.3	327.00
2	347.73	19.16	1.880	0.30(0.15)	0.52	223.8	350.00
3	341.13	20.32	1.818	0.30(0.15)	0.52	227.9	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 350.30 Tc(MIN.) = 18.04
EFFECTIVE AREA(ACRES) = 217.34 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 227.9
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 335.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 468.00 DOWNSTREAM(FEET) = 422.00
FLOW LENGTH(FEET) = 1086.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.36
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 350.30
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 18.70
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 335.00 = 6152.00 FEET.

FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 18.70
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.906
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.00	0.30	0.100	56
COMMERCIAL	B	4.20	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
PUBLIC PARK	B	10.80	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.00	0.30	0.900	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	3.90	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.631
SUBAREA AREA(ACRES) = 23.50 SUBAREA RUNOFF(CFS) = 36.31
EFFECTIVE AREA(ACRES) = 240.84 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 251.4 PEAK FLOW RATE(CFS) = 378.85

FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

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

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MAINLINE Tc(MIN.) = 18.70
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.906
SUBAREA LOSS RATE DATA(AMC II):

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	9.20	0.30	0.500	56
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	0.70	0.30	0.400	56
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	2.90	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.474
SUBAREA AREA(ACRES) = 13.10 SUBAREA RUNOFF(CFS) = 20.80
EFFECTIVE AREA(ACRES) = 253.94 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 264.5 PEAK FLOW RATE(CFS) = 399.64

FLOW PROCESS FROM NODE 335.00 TO NODE 336.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 422.00 DOWNSTREAM(FEET) = 380.00
FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.89
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 399.64
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 19.12
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 336.00 = 6932.00 FEET.

FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 19.12
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.882
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	B	0.60	0.30	0.100	56
COMMERCIAL	B	1.60	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	3.70	0.30	0.200	56
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	5.60	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

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SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.182
SUBAREA AREA (ACRES) = 12.30 SUBAREA RUNOFF (CFS) = 20.23
EFFECTIVE AREA (ACRES) = 266.24 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA (ACRES) = 276.8 PEAK FLOW RATE (CFS) = 414.36

FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 19.12
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.882
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" B 0.20 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.50 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.60 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.40 0.30 0.600 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 16.80 0.30 0.600 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.70 0.30 0.400 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.611
SUBAREA AREA (ACRES) = 22.20 SUBAREA RUNOFF (CFS) = 33.94
EFFECTIVE AREA (ACRES) = 288.44 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA (ACRES) = 299.0 PEAK FLOW RATE (CFS) = 448.30

FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 19.12
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.882
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 6.30 0.30 0.400 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA (ACRES) = 6.30 SUBAREA RUNOFF (CFS) = 9.99
EFFECTIVE AREA (ACRES) = 294.74 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA (ACRES) = 305.3 PEAK FLOW RATE (CFS) = 458.29

FLOW PROCESS FROM NODE 336.00 TO NODE 337.00 IS CODE = 31

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

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

ELEVATION DATA: UPSTREAM (FEET) = 380.00 DOWNSTREAM (FEET) = 350.00
FLOW LENGTH (FEET) = 803.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.1 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 27.70
ESTIMATED PIPE DIAMETER (INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 458.29
PIPE TRAVEL TIME (MIN.) = 0.48 Tc (MIN.) = 19.61
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 337.00 = 7735.00 FEET.

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 19.61
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.855
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 B 3.00 0.30 0.200 56
COMMERCIAL B 1.30 0.30 0.100 56
COMMERCIAL B 2.70 0.30 0.100 56
COMMERCIAL B 6.00 0.30 0.100 56
PUBLIC PARK B 1.30 0.30 0.850 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.189
SUBAREA AREA (ACRES) = 14.70 SUBAREA RUNOFF (CFS) = 23.79
EFFECTIVE AREA (ACRES) = 309.44 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 320.0 PEAK FLOW RATE (CFS) = 474.99

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 19.61
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.855
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 3.30 0.30 0.850 56
PUBLIC PARK B 1.50 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 2.50 0.30 0.200 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 6.70 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.20 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.488
SUBAREA AREA (ACRES) = 16.30 SUBAREA RUNOFF (CFS) = 25.07
EFFECTIVE AREA (ACRES) = 325.74 AREA-AVERAGED Fm (INCH/HR) = 0.15

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 336.3 PEAK FLOW RATE (CFS) = 500.06

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 19.61
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.855

C-36

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	0.60	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.60	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.90	0.30	0.400	56
SCHOOL	B	0.20	0.30	0.600	56
SCHOOL	B	5.90	0.30	0.600	56
SCHOOL	B	6.00	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.526
SUBAREA AREA (ACRES) = 20.20 SUBAREA RUNOFF (CFS) = 30.86
EFFECTIVE AREA (ACRES) = 345.94 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 356.5 PEAK FLOW RATE (CFS) = 530.93

FLOW PROCESS FROM NODE 337.00 TO NODE 338.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 350.00 DOWNSTREAM (FEET) = 332.00
FLOW LENGTH (FEET) = 838.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 72.0 INCH PIPE IS 53.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 23.57
ESTIMATED PIPE DIAMETER (INCH) = 72.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 530.93
PIPE TRAVEL TIME (MIN.) = 0.59 Tc (MIN.) = 20.20
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 338.00 = 8573.00 FEET.

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 20.20
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.824

C-41

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	6.90	0.30	0.200	56
COMMERCIAL	B	1.40	0.30	0.100	56
COMMERCIAL	B	1.90	0.30	0.100	56
COMMERCIAL	B	5.90	0.30	0.100	56

RESIDENTIAL
"11+ DWELLINGS/ACRE" B 3.60 0.30 0.200 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.154
SUBAREA AREA (ACRES) = 19.80 SUBAREA RUNOFF (CFS) = 31.68
EFFECTIVE AREA (ACRES) = 365.74 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA (ACRES) = 376.3 PEAK FLOW RATE (CFS) = 552.84

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 20.20
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.824

C-41

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	1.60	0.30	0.200	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA (ACRES) = 1.60					
SUBAREA RUNOFF (CFS) = 2.54					
EFFECTIVE AREA (ACRES) = 367.34					
AREA-AVERAGED Fm (INCH/HR) = 0.14					
AREA-AVERAGED Fp (INCH/HR) = 0.30					
AREA-AVERAGED Ap = 0.48					
TOTAL AREA (ACRES) = 377.9					
PEAK FLOW RATE (CFS) = 555.38					

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 20.20
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.824

C-41

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.10	0.30	0.100	56
COMMERCIAL	B	8.50	0.30	0.100	56
COMMERCIAL	B	1.90	0.30	0.100	56
COMMERCIAL	B	0.70	0.30	0.100	56
PUBLIC PARK	B	2.60	0.30	0.850	56
PUBLIC PARK	B	0.60	0.30	0.850	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.246					
SUBAREA AREA (ACRES) = 16.40					
SUBAREA RUNOFF (CFS) = 25.83					
EFFECTIVE AREA (ACRES) = 383.74					
AREA-AVERAGED Fm (INCH/HR) = 0.14					
AREA-AVERAGED Fp (INCH/HR) = 0.30					
AREA-AVERAGED Ap = 0.47					
TOTAL AREA (ACRES) = 394.3					
PEAK FLOW RATE (CFS) = 581.21					

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.824

C-41

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	0.20	0.30	0.200	56
COMMERCIAL	B	6.20	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.00	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.70	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.132
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 14.61
EFFECTIVE AREA(ACRES) = 392.84 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 403.4 PEAK FLOW RATE(CFS) = 595.82

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.824

C-41

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	B	1.70	0.30	0.100	56
COMMERCIAL	B	0.80	0.30	0.100	56
COMMERCIAL	B	2.00	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.116
SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 8.70
EFFECTIVE AREA(ACRES) = 398.24 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 408.8 PEAK FLOW RATE(CFS) = 604.52

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.824

C-41

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	0.10	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.16

EFFECTIVE AREA(ACRES) = 398.34 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 408.9 PEAK FLOW RATE(CFS) = 604.68

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.824

C-58

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
COMMERCIAL	B	0.10	0.30	0.100	56
COMMERCIAL	B	1.10	0.30	0.100	56
SCHOOL	B	0.20	0.30	0.600	56
SCHOOL	B	0.50	0.30	0.600	56
SCHOOL	B	1.20	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.316
SUBAREA AREA(ACRES) = 4.40 SUBAREA RUNOFF(CFS) = 6.85
EFFECTIVE AREA(ACRES) = 402.74 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 413.3 PEAK FLOW RATE(CFS) = 611.52

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.824

C-58

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	4.40	0.30	0.100	56
COMMERCIAL	B	3.50	0.30	0.100	56
COMMERCIAL	B	4.70	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.30	0.30	0.200	56
SCHOOL	B	0.60	0.30	0.600	56
SCHOOL	B	0.60	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.145
SUBAREA AREA(ACRES) = 14.10 SUBAREA RUNOFF(CFS) = 22.60
EFFECTIVE AREA(ACRES) = 416.84 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 427.4 PEAK FLOW RATE(CFS) = 634.12

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 20.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.824

C-58

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
SCHOOL	B	3.30	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 4.88
 EFFECTIVE AREA(ACRES) = 420.14 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 430.7 PEAK FLOW RATE(CFS) = 639.00

 FLOW PROCESS FROM NODE 338.00 TO NODE 339.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<< C-58

=====

ELEVATION DATA: UPSTREAM(FEET) = 332.00 DOWNSTREAM(FEET) = 301.00
 FLOW LENGTH(FEET) = 1956.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 81.0 INCH PIPE IS 61.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 21.96
 ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 639.00
 PIPE TRAVEL TIME(MIN.) = 1.48 Tc(MIN.) = 21.68
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

 FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 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	639.00	21.68	1.751	0.30(0.13)	0.45	420.1	327.00
2	627.19	22.82	1.701	0.30(0.13)	0.45	426.6	350.00
3	612.66	24.01	1.652	0.30(0.13)	0.45	430.7	320.00

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 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	321.06	16.47	2.051	0.30(0.11)	0.38	178.8	300.00
2	250.62	27.95	1.514	0.30(0.12)	0.39	195.4	306.00

LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	896.08	16.47	2.051	0.30(0.13)	0.42	497.8	300.00
2	928.07	21.68	1.751	0.30(0.13)	0.43	606.5	327.00
3	909.30	22.82	1.701	0.30(0.13)	0.43	614.6	350.00
4	887.46	24.01	1.652	0.30(0.13)	0.43	620.4	320.00
5	807.64	27.95	1.514	0.30(0.13)	0.43	626.1	306.00

TOTAL AREA(ACRES) = 626.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 928.07 Tc(MIN.) = 21.685
 EFFECTIVE AREA(ACRES) = 606.46 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 626.1
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

 FLOW PROCESS FROM NODE 339.00 TO NODE 340.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 301.00 DOWNSTREAM(FEET) = 300.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 196.00 CHANNEL SLOPE = 0.0051
 GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.94
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.708 C-59

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	31.90	0.30	0.100	56
COMMERCIAL	B	2.30	0.30	0.100	56
COMMERCIAL	B	1.90	0.30	0.100	56
COMMERCIAL	B	1.00	0.30	0.100	56
PUBLIC PARK	B	3.10	0.30	0.850	56
PUBLIC PARK	B	0.80	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.171
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 958.63
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.36
 AVERAGE FLOW DEPTH(FEET) = 0.94 TRAVEL TIME(MIN.) = 0.97
 Tc(MIN.) = 22.66

SUBAREA AREA(ACRES) = 41.00 SUBAREA RUNOFF(CFS) = 61.13
 EFFECTIVE AREA(ACRES) = 647.46 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 667.1 PEAK FLOW RATE(CFS) = 928.07
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
 GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.92

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.92 FLOW VELOCITY(FEET/SEC.) = 3.33
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 340.00 = 10725.00 FEET.

 FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 22.66
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.708 C-59

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	4.00	0.30	0.900	56

RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.80 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.40 0.30 0.900 56
 PUBLIC PARK B 0.10 0.30 0.850 56
 PUBLIC PARK B 0.10 0.30 0.850 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.899
 SUBAREA AREA (ACRES) = 8.40 SUBAREA RUNOFF (CFS) = 10.87
 EFFECTIVE AREA (ACRES) = 655.86 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA (ACRES) = 675.5 PEAK FLOW RATE (CFS) = 934.36

 FLOW PROCESS FROM NODE 340.00 TO NODE 374.00 IS CODE = 31
 =====

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM (FEET) = 300.00 DOWNSTREAM (FEET) = 298.00
 FLOW LENGTH (FEET) = 221.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 102.0 INCH PIPE IS 80.6 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 19.42
 ESTIMATED PIPE DIAMETER (INCH) = 102.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 934.36
 PIPE TRAVEL TIME (MIN.) = 0.19 Tc (MIN.) = 22.85
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 374.00 = 10946.00 FEET.

 FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 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	Ae (ACRES)	HEADWATER NODE
1	916.26	17.64	1.971	0.30 (0.12)	0.41	547.2	300.00
2	934.36	22.85	1.700	0.30 (0.12)	0.42	655.9	327.00
3	917.38	23.99	1.653	0.30 (0.13)	0.42	664.0	350.00
4	897.54	25.19	1.607	0.30 (0.13)	0.42	669.8	320.00
5	825.35	29.17	1.478	0.30 (0.13)	0.42	675.5	306.00

 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 374.00 = 10946.00 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	194.13	37.32	1.283	0.30 (0.24)	0.79	195.1	390.00

 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1068.38	17.64	1.971	0.30 (0.14)	0.46	639.4	300.00
2	1100.52	22.85	1.700	0.30 (0.14)	0.47	775.3	327.00
3	1086.27	23.99	1.653	0.30 (0.14)	0.48	789.4	350.00
4	1069.16	25.19	1.607	0.30 (0.14)	0.48	801.5	320.00
5	1005.31	29.17	1.478	0.30 (0.15)	0.49	828.0	306.00

6 900.77 37.32 1.283 0.30 (0.15) 0.50 870.6 390.00
 TOTAL AREA (ACRES) = 870.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE (CFS) = 1100.52 Tc (MIN.) = 22.845
 EFFECTIVE AREA (ACRES) = 775.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA (ACRES) = 870.6
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

 FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 12
 =====

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

 FLOW PROCESS FROM NODE 374.00 TO NODE 380.00 IS CODE = 31
 =====

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM (FEET) = 298.00 DOWNSTREAM (FEET) = 261.00
 FLOW LENGTH (FEET) = 1402.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 90.0 INCH PIPE IS 68.7 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 30.43
 ESTIMATED PIPE DIAMETER (INCH) = 90.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 1100.52
 PIPE TRAVEL TIME (MIN.) = 0.77 Tc (MIN.) = 23.61
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 380.00 = 15238.00 FEET.

END OF STUDY SUMMARY:
 TOTAL AREA (ACRES) = 870.6 TC (MIN.) = 23.61
 EFFECTIVE AREA (ACRES) = 775.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.474
 PEAK FLOW RATE (CFS) = 1100.52

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1068.38	18.42	1.923	0.30 (0.14)	0.46	639.4	300.00
2	1100.52	23.61	1.668	0.30 (0.14)	0.47	775.3	327.00
3	1086.27	24.76	1.623	0.30 (0.14)	0.48	789.4	350.00
4	1069.16	25.97	1.579	0.30 (0.14)	0.48	801.5	320.00
5	1005.31	29.96	1.455	0.30 (0.15)	0.49	828.0	306.00
6	900.77	38.12	1.268	0.30 (0.15)	0.50	870.6	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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Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA C ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 50-YR EV DECEMBER 2018 CCHIUI *

FILE NAME: PA3C50EV.DAT
TIME/DATE OF STUDY: 09:22 12/19/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

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

USER SPECIFIED STORM EVENT(YEAR) = 50.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 4.440
- 2) 10.00; 3.010
- 3) 15.00; 2.390
- 4) 20.00; 2.030
- 5) 25.00; 1.790
- 6) 30.00; 1.600
- 7) 40.00; 1.370
- 8) 50.00; 1.200
- 9) 60.00; 1.060
- 10) 90.00; 0.860
- 11) 120.00; 0.730
- 12) 180.00; 0.590
- 13) 360.00; 0.410
- 14) 1200.00; 0.170

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 (FT)	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:

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 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) = 320.00
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.) = 6.766
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 3.935

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	0.20	0.30	0.100	56	6.77
PUBLIC PARK	B	0.90	0.30	0.850	56	10.75
COMMERCIAL	B	0.30	0.30	0.100	56	6.77
PUBLIC PARK	B	1.90	0.30	0.850	56	10.75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.736

SUBAREA RUNOFF(CFS) = 11.03

TOTAL AREA(ACRES) = 3.30 PEAK FLOW RATE(CFS) = 11.03

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) = 634.00 DOWNSTREAM ELEVATION(FEET) = 630.00
STREET LENGTH(FEET) = 503.00 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) = 24.31

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.54

HALFSTREET FLOOD WIDTH(FEET) = 21.05

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.93

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.58

STREET FLOW TRAVEL TIME(MIN.) = 2.86 Tc(MIN.) = 9.63

* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 3.116

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.50	0.30	0.100	56
PUBLIC PARK	B	2.10	0.30	0.850	56
SCHOOL	B	4.60	0.30	0.600	56
COMMERCIAL	B	0.30	0.30	0.100	56
PUBLIC PARK	B	1.40	0.30	0.850	56
SCHOOL	B	1.10	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.647
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 26.29
EFFECTIVE AREA(ACRES) = 13.30 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) = 13.3 PEAK FLOW RATE(CFS) = 34.89

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.60 HALFSTREET FLOOD WIDTH(FEET) = 24.26
FLOW VELOCITY(FEET/SEC.) = 3.20 DEPTH*VELOCITY(FT*FT/SEC.) = 1.91
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 823.00 FEET.

FLOW PROCESS FROM NODE 302.00 TO NODE 302.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 9.63
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 3.116
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.00	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	9.30	0.30	0.200	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.30	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.276
SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 32.76
EFFECTIVE AREA(ACRES) = 25.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 25.3 PEAK FLOW RATE(CFS) = 67.65

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) = 630.00 DOWNSTREAM(FEET) = 625.00
FLOW LENGTH(FEET) = 651.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.43
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 67.65
PIPE TRAVEL TIME(MIN.) = 1.15 Tc(MIN.) = 10.78
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1474.00 FEET.

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.78
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.913
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
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.80	0.30	0.400	56
SCHOOL	B	1.30	0.30	0.600	56
COMMERCIAL	B	0.60	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.480
SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 12.71
EFFECTIVE AREA(ACRES) = 30.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 30.4 PEAK FLOW RATE(CFS) = 75.75

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FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.78
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.913
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
SCHOOL	B	5.20	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.520
SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 21.59
EFFECTIVE AREA(ACRES) = 39.10 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 39.1 PEAK FLOW RATE(CFS) = 97.34

C-5

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.78
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.913
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.80	0.30	0.100	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					

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"11+ DWELLINGS/ACRE" B 7.40 0.30 0.200 56
PUBLIC PARK B 0.30 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.50 0.30 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.215
SUBAREA AREA(ACRES) = 11.40 SUBAREA RUNOFF(CFS) = 29.23
EFFECTIVE AREA(ACRES) = 50.50 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
TOTAL AREA(ACRES) = 50.5 PEAK FLOW RATE(CFS) = 126.56

FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 10.78
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.913

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 4.70 0.30 0.100 56
PUBLIC PARK B 2.30 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 4.90 0.30 0.200 56
COMMERCIAL B 1.70 0.30 0.100 56
PUBLIC PARK B 1.80 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 6.20 0.30 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.294
SUBAREA AREA(ACRES) = 21.60 SUBAREA RUNOFF(CFS) = 54.92
EFFECTIVE AREA(ACRES) = 72.10 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 72.1 PEAK FLOW RATE(CFS) = 181.48

FLOW PROCESS FROM NODE 303.00 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) = 625.00 DOWNSTREAM(FEET) = 615.00
FLOW LENGTH(FEET) = 1029.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 43.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.18
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 181.48
PIPE TRAVEL TIME(MIN.) = 1.30 Tc(MIN.) = 12.08
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 305.00 = 2503.00 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.08
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.752

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 2.10 0.30 0.100 56
PUBLIC PARK B 1.80 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 1.00 0.30 0.200 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 5.00 0.30 0.400 56
COMMERCIAL B 2.80 0.30 0.100 56
PUBLIC PARK B 0.90 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.367
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 32.34
EFFECTIVE AREA(ACRES) = 85.70 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 85.7 PEAK FLOW RATE(CFS) = 203.35

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 12.08
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.752

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 1.80 0.30 0.200 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 1.20 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.280
SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 7.20
EFFECTIVE AREA(ACRES) = 88.70 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 88.7 PEAK FLOW RATE(CFS) = 210.55

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 12.08
RAINFALL INTENSITY(INCH/HR) = 2.75
AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.38
EFFECTIVE STREAM AREA(ACRES) = 88.70
TOTAL STREAM AREA(ACRES) = 88.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 210.55

FLOW PROCESS FROM NODE 306.00 TO NODE 307.00 IS CODE = 21

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C-6

C-7

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 317.00
ELEVATION DATA: UPSTREAM(FEET) = 646.00 DOWNSTREAM(FEET) = 645.00

Tc = K*(LENGTH** 3.00)/(ELEVATION CHANGE)**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.296
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.369
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.)
PUBLIC PARK	B	0.40	0.30	0.850	56	15.30
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	0.10	0.30	0.900	56	15.42
PUBLIC PARK	B	1.50	0.30	0.850	56	15.30
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	0.20	0.30	0.900	56	15.42

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.857
SUBAREA RUNOFF(CFS) = 4.18
TOTAL AREA(ACRES) = 2.20 PEAK FLOW RATE(CFS) = 4.18

C-8

FLOW PROCESS FROM NODE 307.00 TO NODE 307.10 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 645.00 DOWNSTREAM ELEVATION(FEET) = 641.00
STREET LENGTH(FEET) = 375.00 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

C-8.1

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) = 7.95
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.46
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.52
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.97
STREET FLOW TRAVEL TIME(MIN.) = 2.48 Tc(MIN.) = 17.78
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.190
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.00	0.30	0.600	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					

" .4 DWELLING/ACRE" B 0.10 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.40 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.649
SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 7.54
EFFECTIVE AREA(ACRES) = 6.40 AREA-AVERAGED Fm(INCH/HR) = 0.22
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.72
TOTAL AREA(ACRES) = 6.4 PEAK FLOW RATE(CFS) = 11.37

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.49
FLOW VELOCITY(FEET/SEC.) = 2.75 DEPTH*VELOCITY(FT*FT/SEC.) = 1.16
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 307.10 = 692.00 FEET.

FLOW PROCESS FROM NODE 307.10 TO NODE 308.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 641.00 DOWNSTREAM ELEVATION(FEET) = 635.00
STREET LENGTH(FEET) = 506.00 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

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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) = 18.42
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 17.38
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.19
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.51
STREET FLOW TRAVEL TIME(MIN.) = 2.65 Tc(MIN.) = 20.43
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.009
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
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.80	0.30	0.600	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.30	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.554
SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 14.10
EFFECTIVE AREA(ACRES) = 14.90 AREA-AVERAGED Fm(INCH/HR) = 0.19
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.63

TOTAL AREA (ACRES) = 14.9 PEAK FLOW RATE (CFS) = 24.43

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.51 HALFSTREET FLOOD WIDTH (FEET) = 19.41
FLOW VELOCITY (FEET/SEC.) = 3.43 DEPTH*VELOCITY (FT*FT/SEC.) = 1.75
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 308.00 = 1198.00 FEET.

FLOW PROCESS FROM NODE 308.00 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) = 635.00 DOWNSTREAM (FEET) = 615.00
FLOW LENGTH (FEET) = 1516.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 8.95
ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 24.43
PIPE TRAVEL TIME (MIN.) = 2.82 Tc (MIN.) = 23.25
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.25
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 1.874

C-10

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include COMMERCIAL, PUBLIC PARK, RESIDENTIAL, SCHOOL, and SUBAREA AVERAGE PVIOUS LOSS RATE.

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.25
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 1.874

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include COMMERCIAL, PUBLIC PARK, RESIDENTIAL, SCHOOL, and SUBAREA AVERAGE PVIOUS LOSS RATE.

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include COMMERCIAL, PUBLIC PARK, RESIDENTIAL, SCHOOL, and SUBAREA AVERAGE PVIOUS LOSS RATE.

C-10

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 23.25
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 1.874

C-10

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include SCHOOL, SUBAREA AVERAGE PVIOUS LOSS RATE, SUBAREA AVERAGE PVIOUS AREA FRACTION, and SUBAREA AREA (ACRES).

FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 23.25
RAINFALL INTENSITY (INCH/HR) = 1.87
AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.49
EFFECTIVE STREAM AREA (ACRES) = 34.70
TOTAL STREAM AREA (ACRES) = 34.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 53.95

** 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 **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	252.83	12.08	2.752	0.30 (0.12)	0.40	106.7	300.00
2	194.41	23.25	1.874	0.30 (0.12)	0.41	123.4	306.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 252.83 Tc(MIN.) = 12.08
EFFECTIVE AREA(ACRES) = 106.73 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 123.4
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 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) = 480.00
FLOW LENGTH(FEET) = 2954.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.11
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 252.83
PIPE TRAVEL TIME(MIN.) = 1.89 Tc(MIN.) = 13.97
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 310.00 = 5668.00 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.97
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.518

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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	B	4.80	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.20	0.30	0.600	56
COMMERCIAL	B	2.30	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.164
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 17.33
EFFECTIVE AREA(ACRES) = 114.53 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 131.2 PEAK FLOW RATE(CFS) = 252.83
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.97
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.518

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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	B	0.10	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
PUBLIC PARK	B	2.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	6.40	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.60	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.371
SUBAREA AREA(ACRES) = 12.30 SUBAREA RUNOFF(CFS) = 26.64
EFFECTIVE AREA(ACRES) = 126.83 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 143.5 PEAK FLOW RATE(CFS) = 274.34

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 13.97
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.518

C-12

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	2.20	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.80	0.30	0.500	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	10.20	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.50	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.70	0.30	0.400	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.514
SUBAREA AREA(ACRES) = 19.50 SUBAREA RUNOFF(CFS) = 41.49
EFFECTIVE AREA(ACRES) = 146.33 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 163.0 PEAK FLOW RATE(CFS) = 315.83

FLOW PROCESS FROM NODE 310.00 TO NODE 311.00 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) = 430.00
FLOW LENGTH(FEET) = 1056.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.83
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 315.83
PIPE TRAVEL TIME(MIN.) = 0.63 Tc(MIN.) = 14.60
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 311.00 = 6724.00 FEET.

FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.60
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.440
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.60 0.30 0.100 56
COMMERCIAL B 3.60 0.30 0.100 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 3.90 0.30 0.200 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 5.10 0.30 0.200 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.80 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.191
SUBAREA AREA(ACRES) = 15.10 SUBAREA RUNOFF(CFS) = 32.38
EFFECTIVE AREA(ACRES) = 161.43 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 178.1 PEAK FLOW RATE(CFS) = 337.87

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FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 14.60
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.440
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" B 6.70 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 13.63
EFFECTIVE AREA(ACRES) = 168.13 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 184.8 PEAK FLOW RATE(CFS) = 351.50

C-13

FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 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) = 373.00
FLOW LENGTH(FEET) = 1373.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.13
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 351.50
PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 15.44
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 312.00 = 8097.00 FEET.

FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.44
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.358
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.50 0.30 0.100 56
COMMERCIAL B 4.50 0.30 0.100 56
APARTMENTS B 3.40 0.30 0.200 56
COMMERCIAL B 0.30 0.30 0.100 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.157
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 20.80
EFFECTIVE AREA(ACRES) = 178.13 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 194.8 PEAK FLOW RATE(CFS) = 359.96

C-42

FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.44
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.358
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" B 0.10 0.30 0.900 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 0.40 0.30 0.500 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 0.10 0.30 0.500 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.567
SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 1.18
EFFECTIVE AREA(ACRES) = 178.73 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38

C-42

TOTAL AREA (ACRES) = 195.4 PEAK FLOW RATE (CFS) = 361.14

FLOW PROCESS FROM NODE 312.00 TO NODE 339.00 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) = 301.00
FLOW LENGTH(FEET) = 1370.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 41.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 29.51
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 361.14
PIPE TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 16.22
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

FLOW PROCESS FROM NODE 390.00 TO NODE 391.00 IS CODE = 21

>>>>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

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)] ** 0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.195
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 3.240

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" B 0.20 0.30 1.000 72 9.20
NATURAL FAIR COVER
"OPEN BRUSH" B 1.20 0.30 1.000 66 9.20
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 3.70
TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 3.70

OC-1

FLOW PROCESS FROM NODE 391.00 TO NODE 392.00 IS CODE = 51

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

=====

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
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.920

OC-2

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,NARROWLEAF" B 1.70 0.30 1.000 72
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 0.60 0.30 1.000 72
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.42
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.95
AVERAGE FLOW DEPTH(FEET) = 0.60 TRAVEL TIME(MIN.) = 1.53
Tc(MIN.) = 10.72
SUBAREA AREA (ACRES) = 2.30 SUBAREA RUNOFF(CFS) = 5.42
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 3.7 PEAK FLOW RATE (CFS) = 8.73

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.67 FLOW VELOCITY(FEET/SEC.) = 6.40
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 392.00 = 862.00 FEET.

FLOW PROCESS FROM NODE 392.00 TO NODE 393.00 IS CODE = 51

>>>>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
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.574

OC-3

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 1.40 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 8.40 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 2.70 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 0.40 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 9.20 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 0.60 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 32.03
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.53

AVERAGE FLOW DEPTH(FEET) = 1.28 TRAVEL TIME(MIN.) = 2.79
Tc(MIN.) = 13.51
SUBAREA AREA(ACRES) = 22.70 SUBAREA RUNOFF(CFS) = 46.46
EFFECTIVE AREA(ACRES) = 26.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 26.4 PEAK FLOW RATE(CFS) = 54.04

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.56 FLOW VELOCITY(FEET/SEC.) = 7.41
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

* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.339

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	1.60	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	5.50	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.80	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.60	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	1.00	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	6.80	0.30	1.000	72

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 69.92
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.87
AVERAGE FLOW DEPTH(FEET) = 1.84 TRAVEL TIME(MIN.) = 2.19
Tc(MIN.) = 15.71
SUBAREA AREA(ACRES) = 17.30 SUBAREA RUNOFF(CFS) = 31.75
EFFECTIVE AREA(ACRES) = 43.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 43.7 PEAK FLOW RATE(CFS) = 80.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.94 FLOW VELOCITY(FEET/SEC.) = 7.10
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.) = 15.71

* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.339

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.50	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.10	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 4.77
EFFECTIVE AREA(ACRES) = 46.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 46.3 PEAK FLOW RATE(CFS) = 84.97

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) = 664.00 CHANNEL SLOPE = 0.0377
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00

* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.231

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	6.30	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	5.90	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	6.80	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.90	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.50	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	0.20	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.996
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 102.88
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.34
AVERAGE FLOW DEPTH(FEET) = 2.16 TRAVEL TIME(MIN.) = 1.51
Tc(MIN.) = 17.21
SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 35.82
EFFECTIVE AREA(ACRES) = 66.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 66.9 PEAK FLOW RATE(CFS) = 116.27

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.26 FLOW VELOCITY(FEET/SEC.) = 7.57
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 395.00 = 3523.00 FEET.

FLOW PROCESS FROM NODE 395.00 TO NODE 395.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.21
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.231 **OC-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,NARROWLEAF" B 12.60 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 3.10 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 2.40 0.30 0.900 56
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.10 0.30 1.000 65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.987
SUBAREA AREA(ACRES) = 18.20 SUBAREA RUNOFF(CFS) = 31.69
EFFECTIVE AREA(ACRES) = 85.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 85.1 PEAK FLOW RATE(CFS) = 147.95

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) = 389.00
FLOW LENGTH(FEET) = 5717.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.03
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 147.95
PIPE TRAVEL TIME(MIN.) = 4.76 Tc(MIN.) = 21.97
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 370.00 = 9240.00 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) = 389.00 DOWNSTREAM(FEET) = 345.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1996.00 CHANNEL SLOPE = 0.0220
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00 **C-50**
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 1.718

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" B 2.90 0.30 1.000 69
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 4.40 0.30 1.000 63
COMMERCIAL B 0.50 0.30 0.100 56
NATURAL FAIR COVER

"GRASS" B 6.60 0.30 1.000 69
NATURAL FAIR COVER
"OPEN BRUSH" B 3.60 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 6.10 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.956
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 163.49
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.74
AVERAGE FLOW DEPTH(FEET) = 2.84 TRAVEL TIME(MIN.) = 4.93
Tc(MIN.) = 26.91
SUBAREA AREA(ACRES) = 24.10 SUBAREA RUNOFF(CFS) = 31.03
EFFECTIVE AREA(ACRES) = 109.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
TOTAL AREA(ACRES) = 109.2 PEAK FLOW RATE(CFS) = 147.95
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.74 FLOW VELOCITY(FEET/SEC.) = 6.56
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 371.00 = 11236.00 FEET.

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.91
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 1.718 **C-50**
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 1.10 0.30 1.000 63
COMMERCIAL B 1.10 0.30 0.100 56
NATURAL FAIR COVER
"GRASS" B 2.00 0.30 1.000 69
NATURAL FAIR COVER
"OPEN BRUSH" B 0.40 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 2.20 0.30 0.900 56
NATURAL FAIR COVER
"OPEN BRUSH" B 0.30 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.830
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 9.39
EFFECTIVE AREA(ACRES) = 116.30 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
TOTAL AREA(ACRES) = 116.3 PEAK FLOW RATE(CFS) = 149.08

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 26.91
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 1.718
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

C-50

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.20	0.30	1.000	65
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	3.00	0.30	1.000	65
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.40	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.975
SUBAREA AREA (ACRES) = 5.50 SUBAREA RUNOFF (CFS) = 7.05
EFFECTIVE AREA (ACRES) = 121.80 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
TOTAL AREA (ACRES) = 121.8 PEAK FLOW RATE (CFS) = 156.14

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 26.91
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 1.718
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	1.40	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.10	0.30	1.000	65

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.907
SUBAREA AREA (ACRES) = 1.50 SUBAREA RUNOFF (CFS) = 1.95
EFFECTIVE AREA (ACRES) = 123.30 AREA-AVERAGED Fm (INCH/HR) = 0.29
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
TOTAL AREA (ACRES) = 123.3 PEAK FLOW RATE (CFS) = 158.09

C-50

FLOW PROCESS FROM NODE 371.00 TO NODE 372.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 345.00 DOWNSTREAM (FEET) = 301.00
FLOW LENGTH (FEET) = 488.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.1 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 30.07
ESTIMATED PIPE DIAMETER (INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 158.09
PIPE TRAVEL TIME (MIN.) = 0.27 Tc (MIN.) = 27.18
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 372.00 = 11724.00 FEET.

FLOW PROCESS FROM NODE 372.00 TO NODE 373.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM (FEET) = 301.00 DOWNSTREAM (FEET) = 300.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 924.00 CHANNEL SLOPE = 0.0011
GIVEN CHANNEL BASE (FEET) = 30.00 CHANNEL FREEBOARD (FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
*ESTIMATED CHANNEL HEIGHT (FEET) = 3.18
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 1.519

C-60

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	32.30	0.30	0.100	56
COMMERCIAL	B	2.70	0.30	0.100	56
COMMERCIAL	B	0.60	0.30	0.100	56
COMMERCIAL	B	1.80	0.30	0.100	56
PUBLIC PARK	B	7.20	0.30	0.850	56
PUBLIC PARK	B	9.80	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.334
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 192.82
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 2.42
AVERAGE FLOW DEPTH (FEET) = 2.18 TRAVEL TIME (MIN.) = 6.35
Tc (MIN.) = 33.53

SUBAREA AREA (ACRES) = 54.40 SUBAREA RUNOFF (CFS) = 69.45
EFFECTIVE AREA (ACRES) = 177.70 AREA-AVERAGED Fm (INCH/HR) = 0.23
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.78
TOTAL AREA (ACRES) = 177.7 PEAK FLOW RATE (CFS) = 205.48
GIVEN CHANNEL BASE (FEET) = 30.00 CHANNEL FREEBOARD (FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
*ESTIMATED CHANNEL HEIGHT (FEET) = 3.26

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 2.26 FLOW VELOCITY (FEET/SEC.) = 2.48
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 373.00 = 12648.00 FEET.

FLOW PROCESS FROM NODE 373.00 TO NODE 373.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 33.53
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 1.519
SUBAREA LOSS RATE DATA (AMC II):

C-60

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	2.60	0.30	0.850	56
PUBLIC PARK	B	2.10	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	3.50	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	4.80	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	3.60	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.80	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.886

SUBAREA AREA (ACRES) = 17.40 SUBAREA RUNOFF (CFS) = 19.62
EFFECTIVE AREA (ACRES) = 195.10 AREA-AVERAGED Fm (INCH/HR) = 0.24
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.79
TOTAL AREA (ACRES) = 195.1 PEAK FLOW RATE (CFS) = 225.10

FLOW PROCESS FROM NODE 373.00 TO NODE 374.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 300.00 DOWNSTREAM (FEET) = 298.00
FLOW LENGTH (FEET) = 1188.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 81.0 INCH PIPE IS 66.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 7.19
ESTIMATED PIPE DIAMETER (INCH) = 81.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 225.10
PIPE TRAVEL TIME (MIN.) = 2.75 Tc (MIN.) = 36.28
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

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) = 622.00 DOWNSTREAM (FEET) = 621.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 10.511
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.947

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.)
APARTMENTS	B	1.50	0.30	0.200	56	10.51
APARTMENTS	B	2.00	0.30	0.200	56	10.51

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF (CFS) = 9.09
TOTAL AREA (ACRES) = 3.50 PEAK FLOW RATE (CFS) = 9.09

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) = 621.00 DOWNSTREAM ELEVATION (FEET) = 612.00
STREET LENGTH (FEET) = 569.00 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) = 15.28
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.43
HALFSTREET FLOOD WIDTH (FEET) = 15.12
AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.42
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.48
STREET FLOW TRAVEL TIME (MIN.) = 2.77 Tc (MIN.) = 13.28
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.603

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	2.20	0.30	0.200	56
APARTMENTS	B	3.20	0.30	0.200	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA (ACRES) = 5.40 SUBAREA RUNOFF (CFS) = 12.36
EFFECTIVE AREA (ACRES) = 8.90 AREA-AVERAGED Fm (INCH/HR) = 0.06
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.20
TOTAL AREA (ACRES) = 8.9 PEAK FLOW RATE (CFS) = 20.37

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.47 HALFSTREET FLOOD WIDTH (FEET) = 17.07
FLOW VELOCITY (FEET/SEC.) = 3.64 DEPTH*VELOCITY (FT*FT/SEC.) = 1.70
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 322.00 = 899.00 FEET.

FLOW PROCESS FROM NODE 322.00 TO NODE 324.00 IS CODE = 62

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

=====

UPSTREAM ELEVATION (FEET) = 612.00 DOWNSTREAM ELEVATION (FEET) = 590.00
STREET LENGTH (FEET) = 891.00 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

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C-15

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 31.98
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.50
 HALFSTREET FLOOD WIDTH(FEET) = 18.71
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.82
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.39
 STREET FLOW TRAVEL TIME(MIN.) = 3.08 Tc(MIN.) = 16.37
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.292

C-17

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	3.00	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	5.70	0.30	0.400	56
CONDOMINIUMS	B	1.20	0.30	0.350	56
PUBLIC PARK	B	0.30	0.30	0.850	56
PUBLIC PARK	B	0.90	0.30	0.850	56
COMMERCIAL	B	0.80	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.420
 SUBAREA AREA(ACRES) = 11.90 SUBAREA RUNOFF(CFS) = 23.19
 EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.33
 TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 41.07

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.66
 FLOW VELOCITY(FEET/SEC.) = 5.12 DEPTH*VELOCITY(FT*FT/SEC.) = 2.72
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 324.00 = 1790.00 FEET.

 FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.37
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.292
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.70	0.30	0.100	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.70 SUBAREA RUNOFF(CFS) = 3.46
 EFFECTIVE AREA(ACRES) = 22.50 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
 TOTAL AREA(ACRES) = 22.5 PEAK FLOW RATE(CFS) = 44.53

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 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) = 590.00 DOWNSTREAM(FEET) = 575.00
 FLOW LENGTH(FEET) = 529.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.08
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 44.53
 PIPE TRAVEL TIME(MIN.) = 0.63 Tc(MIN.) = 16.99
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 325.00 = 2319.00 FEET.

 FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.99
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.246
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.50	0.30	0.100	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.30	0.30	0.600	56
COMMERCIAL	B	0.30	0.30	0.100	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.10	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.544
 SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 13.50
 EFFECTIVE AREA(ACRES) = 29.70 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 29.7 PEAK FLOW RATE(CFS) = 57.11

C-18

 FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 16.99
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.246
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.80	0.30	0.600	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	10.20	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.606
 SUBAREA AREA(ACRES) = 15.30 SUBAREA RUNOFF(CFS) = 28.43
 EFFECTIVE AREA(ACRES) = 45.00 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 45.0 PEAK FLOW RATE(CFS) = 85.54

C-18

 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) = 575.00 DOWNSTREAM(FEET) = 515.00
FLOW LENGTH(FEET) = 284.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 35.35
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 85.54
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 17.13
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 326.00 = 2603.00 FEET.

FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.13
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.237
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.70 0.30 0.100 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56
COMMERCIAL B 1.40 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.30 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.582
SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 10.02
EFFECTIVE AREA(ACRES) = 50.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 95.18

C-14

FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.13
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.237
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 2.10 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.80 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.557
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 9.13
EFFECTIVE AREA(ACRES) = 55.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 55.3 PEAK FLOW RATE(CFS) = 104.30

C-14

FLOW PROCESS FROM NODE 326.00 TO NODE 333.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 515.00 DOWNSTREAM(FEET) = 500.00
FLOW LENGTH(FEET) = 1644.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.29
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 104.30
PIPE TRAVEL TIME(MIN.) = 2.43 Tc(MIN.) = 19.55
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.55
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.062
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.40 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.20 0.30 0.900 56
COMMERCIAL B 1.80 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
COMMERCIAL B 5.60 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.10 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 24.91
EFFECTIVE AREA(ACRES) = 69.70 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 69.7 PEAK FLOW RATE(CFS) = 120.52

C-20

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 19.55
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.062
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" B 0.20 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.34
EFFECTIVE AREA(ACRES) = 69.90 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 69.9 PEAK FLOW RATE(CFS) = 120.86

C-20

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 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.) = 19.55
RAINFALL INTENSITY(INCH/HR) = 2.06
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.47
EFFECTIVE STREAM AREA(ACRES) = 69.90
TOTAL STREAM AREA(ACRES) = 69.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 120.86

FLOW PROCESS FROM NODE 327.00 TO NODE 327.50 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) = 615.00 DOWNSTREAM(FEET) = 614.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.844
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 3.054

C-21

SUBAREA Tc AND LOSS RATE DATA(AMC II):

Table with 8 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include COMMERCIAL, PUBLIC PARK, RESIDENTIAL, and "8-10 DWELLINGS/ACRE".

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.383
SUBAREA RUNOFF(CFS) = 2.38
TOTAL AREA(ACRES) = 0.90 PEAK FLOW RATE(CFS) = 2.38

FLOW PROCESS FROM NODE 327.50 TO NODE 328.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 614.00 DOWNSTREAM ELEVATION(FEET) = 610.00
STREET LENGTH(FEET) = 425.00 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) = 6.05

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.36
HALFSTREET FLOOD WIDTH(FEET) = 11.29
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.27
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.83
STREET FLOW TRAVEL TIME(MIN.) = 3.12 Tc(MIN.) = 12.97
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.642

C-21.1

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, PUBLIC PARK, RESIDENTIAL, and "8-10 DWELLINGS/ACRE".

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.348
SUBAREA AREA(ACRES) = 3.20 SUBAREA RUNOFF(CFS) = 7.31
EFFECTIVE AREA(ACRES) = 4.10 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 4.1 PEAK FLOW RATE(CFS) = 9.36

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 13.71
FLOW VELOCITY(FEET/SEC.) = 2.50 DEPTH*VELOCITY(FT*FT/SEC.) = 1.02
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 328.00 = 754.00 FEET.

FLOW PROCESS FROM NODE 328.00 TO NODE 329.00 IS CODE = 62

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

UPSTREAM ELEVATION(FEET) = 610.00 DOWNSTREAM ELEVATION(FEET) = 595.00
STREET LENGTH(FEET) = 366.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

C-22

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) = 16.07

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.62

AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.97
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.93
 STREET FLOW TRAVEL TIME (MIN.) = 1.23 Tc (MIN.) = 14.19
 * 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.490
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.10	0.30	0.400	56
COMMERCIAL	B	0.50	0.30	0.100	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.10	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
 SUBAREA AREA (ACRES) = 6.30 SUBAREA RUNOFF (CFS) = 13.43
 EFFECTIVE AREA (ACRES) = 10.40 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA (ACRES) = 10.4 PEAK FLOW RATE (CFS) = 22.22

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.42 HALFSTREET FLOOD WIDTH (FEET) = 14.49
 FLOW VELOCITY (FEET/SEC.) = 5.37 DEPTH*VELOCITY (FT*FT/SEC.) = 2.26
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 329.00 = 1120.00 FEET.

 FLOW PROCESS FROM NODE 329.00 TO NODE 329.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 14.19
 * 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.490
 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	2.80	0.30	0.400	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	6.10	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.402
 SUBAREA AREA (ACRES) = 9.00 SUBAREA RUNOFF (CFS) = 19.19
 EFFECTIVE AREA (ACRES) = 19.40 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA (ACRES) = 19.4 PEAK FLOW RATE (CFS) = 41.42

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 FLOW PROCESS FROM NODE 329.00 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) = 595.00 DOWNSTREAM (FEET) = 575.00
 FLOW LENGTH (FEET) = 378.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.8 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 17.60
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 41.42
 PIPE TRAVEL TIME (MIN.) = 0.36 Tc (MIN.) = 14.55
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 330.00 = 1498.00 FEET.

 FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 14.55
 * 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.446
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.90	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.50	0.30	0.400	56
COMMERCIAL	B	0.60	0.30	0.100	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	10.20	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.90	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.561
 SUBAREA AREA (ACRES) = 19.20 SUBAREA RUNOFF (CFS) = 39.36
 EFFECTIVE AREA (ACRES) = 38.60 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 38.6 PEAK FLOW RATE (CFS) = 80.00

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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) = 575.00 DOWNSTREAM (FEET) = 555.00
 FLOW LENGTH (FEET) = 457.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.1 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 18.90
 ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 80.00
 PIPE TRAVEL TIME (MIN.) = 0.40 Tc (MIN.) = 14.95
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 331.00 = 1955.00 FEET.

 FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 81

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

MAINLINE Tc (MIN.) = 14.95
 * 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.396
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ SCS SOIL	AREA	Fp	Ap	SCS

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LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
PUBLIC PARK	B	1.10	0.30	0.850	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.80	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	10.50	0.30	0.600	56
COMMERCIAL	B	0.30	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.50	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	13.70	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.619
SUBAREA AREA(ACRES) = 26.90 SUBAREA RUNOFF(CFS) = 53.51
EFFECTIVE AREA(ACRES) = 65.50 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 65.5 PEAK FLOW RATE(CFS) = 131.77

FLOW PROCESS FROM NODE 331.00 TO NODE 332.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 555.00 DOWNSTREAM(FEET) = 520.00
FLOW LENGTH(FEET) = 324.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.84
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 131.77
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 15.13
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 332.00 = 2279.00 FEET.

FLOW PROCESS FROM NODE 332.00 TO NODE 332.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 15.13
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.381
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.10	0.30	0.900	56
COMMERCIAL	B	3.70	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	5.00	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.621
SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 21.53
EFFECTIVE AREA(ACRES) = 76.40 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 76.4 PEAK FLOW RATE(CFS) = 152.41

FLOW PROCESS FROM NODE 332.00 TO NODE 333.00 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) = 500.00
FLOW LENGTH(FEET) = 1740.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.67
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 152.41
PIPE TRAVEL TIME(MIN.) = 2.12 Tc(MIN.) = 17.25
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 333.00 = 4019.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.25
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.228
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.20	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	4.40	0.30	0.900	56
COMMERCIAL	B	3.90	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	9.80	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.689
SUBAREA AREA(ACRES) = 19.30 SUBAREA RUNOFF(CFS) = 35.11
EFFECTIVE AREA(ACRES) = 95.70 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 95.7 PEAK FLOW RATE(CFS) = 177.03

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 17.25
RAINFALL INTENSITY(INCH/HR) = 2.23
AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.58
EFFECTIVE STREAM AREA(ACRES) = 95.70
TOTAL STREAM AREA(ACRES) = 95.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 177.03

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	120.86	19.55	2.062	0.30(0.14)	0.47	69.9	320.00
2	177.03	17.25	2.228	0.30(0.17)	0.58	95.7	327.00

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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	292.84	17.25	2.228	0.30(0.16)	0.53	157.4	327.00
2	283.58	19.55	2.062	0.30(0.16)	0.53	165.6	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 292.84 Tc(MIN.) = 17.25
EFFECTIVE AREA(ACRES) = 157.36 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 165.6
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 334.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 500.00 DOWNSTREAM(FEET) = 468.00
FLOW LENGTH(FEET) = 819.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.34
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 292.84
PIPE TRAVEL TIME(MIN.) = 0.54 Tc(MIN.) = 17.79
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.79 **C-28**
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.189
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 4.00 0.30 0.200 56
COMMERCIAL B 2.30 0.30 0.100 56
COMMERCIAL B 1.00 0.30 0.100 56
PUBLIC PARK B 0.40 0.30 0.850 56
PUBLIC PARK B 2.40 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 3.50 0.30 0.200 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.310
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 25.66
EFFECTIVE AREA(ACRES) = 170.96 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 179.2 PEAK FLOW RATE(CFS) = 313.01

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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

MAINLINE Tc(MIN.) = 17.79 **C-28**
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.189
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 2.00 0.30 0.200 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 1.60 0.30 0.400 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 2.10 0.30 0.400 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA(ACRES) = 5.70 SUBAREA RUNOFF(CFS) = 10.72
EFFECTIVE AREA(ACRES) = 176.66 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 184.9 PEAK FLOW RATE(CFS) = 323.74

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 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.) = 17.79
RAINFALL INTENSITY(INCH/HR) = 2.19
AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.51
EFFECTIVE STREAM AREA(ACRES) = 176.66
TOTAL STREAM AREA(ACRES) = 184.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 323.74

FLOW PROCESS FROM NODE 350.00 TO NODE 351.00 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) = 495.00 DOWNSTREAM(FEET) = 492.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20 **C-45**
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.730
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.920
SUBAREA Tc AND LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.80 0.30 0.600 56 10.73
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.70 0.30 0.600 56 10.73
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600

SUBAREA RUNOFF(CFS) = 6.16
TOTAL AREA(ACRES) = 2.50 PEAK FLOW RATE(CFS) = 6.16

FLOW PROCESS FROM NODE 351.00 TO NODE 352.00 IS CODE = 62

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

=====

UPSTREAM ELEVATION(FEET) = 492.00 DOWNSTREAM ELEVATION(FEET) = 488.00
STREET LENGTH(FEET) = 456.00 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

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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) = 9.99
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 14.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.46
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.03
STREET FLOW TRAVEL TIME(MIN.) = 3.09 Tc(MIN.) = 13.82
* 50 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
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.20	0.30	0.600	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.40	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 7.64
EFFECTIVE AREA(ACRES) = 6.10 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 6.1 PEAK FLOW RATE(CFS) = 12.94

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45 HALFSTREET FLOOD WIDTH(FEET) = 15.98
FLOW VELOCITY(FEET/SEC.) = 2.62 DEPTH*VELOCITY(FT*FT/SEC.) = 1.17
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 352.00 = 786.00 FEET.

FLOW PROCESS FROM NODE 352.00 TO NODE 353.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 488.00 DOWNSTREAM(FEET) = 485.00
FLOW LENGTH(FEET) = 883.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 4.74
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.94
PIPE TRAVEL TIME(MIN.) = 3.11 Tc(MIN.) = 16.92
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 353.00 = 1669.00 FEET.

FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 16.92
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.252
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	0.50	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.10	0.30	0.400	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.60	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.50	0.30	0.400	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.70	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.471
SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 16.14
EFFECTIVE AREA(ACRES) = 14.60 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 27.52

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FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN.) = 16.92
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.252
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	0.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.58
EFFECTIVE AREA(ACRES) = 14.90 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.9 PEAK FLOW RATE(CFS) = 28.09

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FLOW PROCESS FROM NODE 353.00 TO NODE 334.00 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) = 485.00 DOWNSTREAM(FEET) = 468.00
FLOW LENGTH(FEET) = 1136.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.00
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 28.09
PIPE TRAVEL TIME(MIN.) = 1.89 Tc(MIN.) = 18.82
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 334.00 = 2805.00 FEET.

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FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 18.82
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.115
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B        0.90   0.30   0.100  56
PUBLIC PARK         B        2.00   0.30   0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        1.40   0.30   0.200  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B        1.50   0.30   0.400  56
COMMERCIAL          B        0.50   0.30   0.100  56
PUBLIC PARK         B        1.50   0.30   0.850  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.512
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 13.77
EFFECTIVE AREA(ACRES) = 22.70 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 22.7 PEAK FLOW RATE(CFS) = 40.03

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FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 18.82
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.115
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        3.10   0.30   0.200  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B        1.40   0.30   0.400  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.262
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 8.25
EFFECTIVE AREA(ACRES) = 27.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 27.2 PEAK FLOW RATE(CFS) = 48.28

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*****
FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

```

=====
MAINLINE Tc(MIN.) = 18.82
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.115
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK         B        0.50   0.30   0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B        0.10   0.30   0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        1.20   0.30   0.600  56
PUBLIC PARK         B        2.70   0.30   0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B        0.20   0.30   0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        7.30   0.30   0.600  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.674
SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 20.66
EFFECTIVE AREA(ACRES) = 39.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 39.2 PEAK FLOW RATE(CFS) = 68.94

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*****
FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 18.82
* 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.115
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B        0.10   0.30   0.100  56
PUBLIC PARK         B        0.60   0.30   0.850  56
SCHOOL              B        3.10   0.30   0.600  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.626
SUBAREA AREA(ACRES) = 3.80 SUBAREA RUNOFF(CFS) = 6.59
EFFECTIVE AREA(ACRES) = 43.00 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 43.0 PEAK FLOW RATE(CFS) = 75.53

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FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 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.) = 18.82
RAINFALL INTENSITY(INCH/HR) = 2.12
AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.54

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EFFECTIVE STREAM AREA(ACRES) = 43.00
 TOTAL STREAM AREA(ACRES) = 43.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 75.53

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	323.74	17.79	2.189	0.30(0.15)	0.51	176.7	327.00
1	311.66	20.09	2.025	0.30(0.15)	0.51	184.9	320.00
2	75.53	18.82	2.115	0.30(0.16)	0.54	43.0	350.00

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	397.84	17.79	2.189	0.30(0.16)	0.52	217.3	327.00
2	393.87	18.82	2.115	0.30(0.15)	0.52	223.3	350.00
3	383.72	20.09	2.025	0.30(0.15)	0.52	227.9	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 397.84 Tc(MIN.) = 17.79
 EFFECTIVE AREA(ACRES) = 217.30 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 227.9
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 335.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 468.00 DOWNSTREAM(FEET) = 422.00
 FLOW LENGTH(FEET) = 1086.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.31
 ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 397.84
 PIPE TRAVEL TIME(MIN.) = 0.64 Tc(MIN.) = 18.43
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 335.00 = 6152.00 FEET.

FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 18.43
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.143
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.00	0.30	0.100	56
COMMERCIAL	B	4.20	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
PUBLIC PARK	B	10.80	0.30	0.850	56
RESIDENTIAL					

" .4 DWELLING/ACRE" B 1.00 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 3.90 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.631
 SUBAREA AREA(ACRES) = 23.50 SUBAREA RUNOFF(CFS) = 41.33
 EFFECTIVE AREA(ACRES) = 240.80 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 251.4 PEAK FLOW RATE(CFS) = 430.17

FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 18.43
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.143

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SCS DEVELOPMENT TYPE/
LAND USE

SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL				
"3-4 DWELLINGS/ACRE"	B 0.10	0.30	0.600	56
RESIDENTIAL				
"3-4 DWELLINGS/ACRE"	B 0.10	0.30	0.600	56
RESIDENTIAL				
"5-7 DWELLINGS/ACRE"	B 0.10	0.30	0.500	56
RESIDENTIAL				
"5-7 DWELLINGS/ACRE"	B 9.20	0.30	0.500	56
RESIDENTIAL				
"8-10 DWELLINGS/ACRE"	B 0.70	0.30	0.400	56
RESIDENTIAL				
"8-10 DWELLINGS/ACRE"	B 2.90	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.474
 SUBAREA AREA(ACRES) = 13.10 SUBAREA RUNOFF(CFS) = 23.59
 EFFECTIVE AREA(ACRES) = 253.90 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 264.5 PEAK FLOW RATE(CFS) = 453.77

FLOW PROCESS FROM NODE 335.00 TO NODE 336.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 422.00 DOWNSTREAM(FEET) = 380.00
 FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 31.97
 ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 453.77
 PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 18.83
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 336.00 = 6932.00 FEET.

FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 18.83
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.114
 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	B	0.60	0.30	0.100	56
COMMERCIAL	B	1.60	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.70	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.60	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.182
 SUBAREA AREA(ACRES) = 12.30 SUBAREA RUNOFF(CFS) = 22.80
 EFFECTIVE AREA(ACRES) = 266.20 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 276.8 PEAK FLOW RATE(CFS) = 469.87

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 FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.83
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.114
 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	0.20	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.40	0.30	0.600	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	16.80	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.70	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.611
 SUBAREA AREA(ACRES) = 22.20 SUBAREA RUNOFF(CFS) = 38.57
 EFFECTIVE AREA(ACRES) = 288.40 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 299.0 PEAK FLOW RATE(CFS) = 508.45

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 FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.83
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.114
 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	6.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
 SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 11.31
 EFFECTIVE AREA(ACRES) = 294.70 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 305.3 PEAK FLOW RATE(CFS) = 519.75

 FLOW PROCESS FROM NODE 336.00 TO NODE 337.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 380.00 DOWNSTREAM(FEET) = 350.00
 FLOW LENGTH(FEET) = 803.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 49.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.60
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 519.75
 PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 19.30
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 337.00 = 7735.00 FEET.

 FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.30
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.080
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	0.40	0.30	0.200	56
APARTMENTS	B	3.00	0.30	0.200	56
COMMERCIAL	B	1.30	0.30	0.100	56
COMMERCIAL	B	2.70	0.30	0.100	56
COMMERCIAL	B	6.00	0.30	0.100	56
PUBLIC PARK	B	1.30	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.189
 SUBAREA AREA(ACRES) = 14.70 SUBAREA RUNOFF(CFS) = 26.77
 EFFECTIVE AREA(ACRES) = 309.40 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 320.0 PEAK FLOW RATE(CFS) = 537.59

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 FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.30
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.080
 SUBAREA LOSS RATE DATA(AMC II):

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LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
PUBLIC PARK	B	3.30	0.30	0.850	56
PUBLIC PARK	B	1.50	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	2.50	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	6.70	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.30
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.080

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	0.60	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.60	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.90	0.30	0.400	56
SCHOOL	B	0.20	0.30	0.600	56
SCHOOL	B	5.90	0.30	0.600	56
SCHOOL	B	6.00	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.526
SUBAREA AREA(ACRES) = 20.20 SUBAREA RUNOFF(CFS) = 34.95
EFFECTIVE AREA(ACRES) = 345.90 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 356.5 PEAK FLOW RATE(CFS) = 600.91

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FLOW PROCESS FROM NODE 337.00 TO NODE 338.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 350.00 DOWNSTREAM(FEET) = 332.00
FLOW LENGTH(FEET) = 838.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.27
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 600.91
PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 19.88
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 338.00 = 8573.00 FEET.

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.88
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.039

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	6.90	0.30	0.200	56
COMMERCIAL	B	1.40	0.30	0.100	56
COMMERCIAL	B	1.90	0.30	0.100	56
COMMERCIAL	B	5.90	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.60	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.154
SUBAREA AREA(ACRES) = 19.80 SUBAREA RUNOFF(CFS) = 35.51
EFFECTIVE AREA(ACRES) = 365.70 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 376.3 PEAK FLOW RATE(CFS) = 623.53

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.88
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.039

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	1.60	0.30	0.200	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 1.60 SUBAREA RUNOFF(CFS) = 2.85
EFFECTIVE AREA(ACRES) = 367.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 377.9 PEAK FLOW RATE(CFS) = 626.38

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FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.88
* 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.039

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.10	0.30	0.100	56
COMMERCIAL	B	8.50	0.30	0.100	56
COMMERCIAL	B	1.90	0.30	0.100	56

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COMMERCIAL B 0.70 0.30 0.100 56
 PUBLIC PARK B 2.60 0.30 0.850 56
 PUBLIC PARK B 0.60 0.30 0.850 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.246
 SUBAREA AREA (ACRES) = 16.40 SUBAREA RUNOFF (CFS) = 29.00
 EFFECTIVE AREA (ACRES) = 383.70 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA (ACRES) = 394.3 PEAK FLOW RATE (CFS) = 655.38

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 19.88
 * 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.039 C-41

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 0.20 0.30 0.200 56
 COMMERCIAL B 6.20 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.00 0.30 0.200 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.70 0.30 0.200 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.132
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 16.37
 EFFECTIVE AREA (ACRES) = 392.80 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 403.4 PEAK FLOW RATE (CFS) = 671.75

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 19.88
 * 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.039 C-41

SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL B 0.70 0.30 0.100 56
 COMMERCIAL B 1.70 0.30 0.100 56
 COMMERCIAL B 0.80 0.30 0.100 56
 COMMERCIAL B 2.00 0.30 0.100 56
 PUBLIC PARK B 0.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.116
 SUBAREA AREA (ACRES) = 5.40 SUBAREA RUNOFF (CFS) = 9.74
 EFFECTIVE AREA (ACRES) = 398.20 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 408.8 PEAK FLOW RATE (CFS) = 681.49

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 19.88
 * 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.039 C-41

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 0.10 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA (ACRES) = 0.10 SUBAREA RUNOFF (CFS) = 0.18
 EFFECTIVE AREA (ACRES) = 398.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 408.9 PEAK FLOW RATE (CFS) = 681.67

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 19.88
 * 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.039 C-58

SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL B 1.30 0.30 0.100 56
 COMMERCIAL B 0.10 0.30 0.100 56
 COMMERCIAL B 1.10 0.30 0.100 56
 SCHOOL B 0.20 0.30 0.600 56
 SCHOOL B 0.50 0.30 0.600 56
 SCHOOL B 1.20 0.30 0.600 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.316
 SUBAREA AREA (ACRES) = 4.40 SUBAREA RUNOFF (CFS) = 7.70
 EFFECTIVE AREA (ACRES) = 402.70 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 413.3 PEAK FLOW RATE (CFS) = 689.37

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 19.88
 * 50 YEAR RAINFALL INTENSITY (INCH/HR) = 2.039 C-58

SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

COMMERCIAL B 4.40 0.30 0.100 56
 COMMERCIAL B 3.50 0.30 0.100 56
 COMMERCIAL B 4.70 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.30 0.30 0.200 56
 SCHOOL B 0.60 0.30 0.600 56

SCHOOL B 0.60 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.145
 SUBAREA AREA(ACRES) = 14.10 SUBAREA RUNOFF(CFS) = 25.32
 EFFECTIVE AREA(ACRES) = 416.80 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 427.4 PEAK FLOW RATE(CFS) = 714.69

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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MAINLINE Tc(MIN.) = 19.88
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 2.039 **C-58**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 SCHOOL B 3.30 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 5.52
 EFFECTIVE AREA(ACRES) = 420.10 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 430.7 PEAK FLOW RATE(CFS) = 720.22

 FLOW PROCESS FROM NODE 338.00 TO NODE 339.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<< **C-58**
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 332.00 DOWNSTREAM(FEET) = 301.00
 FLOW LENGTH(FEET) = 1956.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 84.0 INCH PIPE IS 65.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.55
 ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 720.22
 PIPE TRAVEL TIME(MIN.) = 1.45 Tc(MIN.) = 21.32
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

 FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 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	720.22	21.32	1.967	0.30(0.13)	0.45	420.1	327.00
2	710.30	22.36	1.917	0.30(0.13)	0.45	426.1	350.00
3	693.52	23.67	1.854	0.30(0.13)	0.45	430.7	320.00

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 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	720.22	21.32	1.967	0.30(0.13)	0.45	420.1	327.00
2	710.30	22.36	1.917	0.30(0.13)	0.45	426.1	350.00
3	693.52	23.67	1.854	0.30(0.13)	0.45	430.7	320.00

1 361.14 16.22 2.302 0.30(0.11) 0.38 178.7 300.00
 2 281.83 27.70 1.688 0.30(0.12) 0.39 195.4 306.00
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1009.32	16.22	2.302	0.30(0.13)	0.42	498.3	300.00
2	1046.09	21.32	1.967	0.30(0.13)	0.43	606.2	327.00
3	1029.02	22.36	1.917	0.30(0.13)	0.43	613.8	350.00
4	1003.17	23.67	1.854	0.30(0.13)	0.43	620.3	320.00
5	908.31	27.70	1.688	0.30(0.13)	0.43	626.1	306.00

TOTAL AREA(ACRES) = 626.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1046.09 Tc(MIN.) = 21.322
 EFFECTIVE AREA(ACRES) = 606.24 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 626.1
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

 FLOW PROCESS FROM NODE 339.00 TO NODE 340.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 301.00 DOWNSTREAM(FEET) = 300.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 196.00 CHANNEL SLOPE = 0.0051
 GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030

*ESTIMATED CHANNEL HEIGHT(FEET) = 2.01 **C-59**
 * 50 YEAR RAINFALL INTENSITY(INCH/HR) = 1.922
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 31.90 0.30 0.100 56
 COMMERCIAL B 2.30 0.30 0.100 56
 COMMERCIAL B 1.90 0.30 0.100 56
 COMMERCIAL B 1.00 0.30 0.100 56
 PUBLIC PARK B 3.10 0.30 0.850 56
 PUBLIC PARK B 0.80 0.30 0.850 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.171
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1080.60
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.53
 AVERAGE FLOW DEPTH(FEET) = 1.01 TRAVEL TIME(MIN.) = 0.93
 Tc(MIN.) = 22.25

SUBAREA AREA(ACRES) = 41.00 SUBAREA RUNOFF(CFS) = 69.03
 EFFECTIVE AREA(ACRES) = 647.24 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 667.1 PEAK FLOW RATE(CFS) = 1047.97
 GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.99

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.99 FLOW VELOCITY(FEET/SEC.) = 3.50

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 340.00 = 10725.00 FEET.

FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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MAINLINE Tc(MIN.) =	22.25					
* 50 YEAR RAINFALL INTENSITY(INCH/HR) =	1.922	C-59				
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"	B	4.00	0.30	0.900	56	
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	1.80	0.30	0.900	56	
RESIDENTIAL						
" .4 DWELLING/ACRE"	B	2.40	0.30	0.900	56	
PUBLIC PARK	B	0.10	0.30	0.850	56	
PUBLIC PARK	B	0.10	0.30	0.850	56	
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =	0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =	0.899					
SUBAREA AREA(ACRES) =	8.40	SUBAREA RUNOFF(CFS) =	12.49			
EFFECTIVE AREA(ACRES) =	655.64	AREA-AVERAGED Fm(INCH/HR) =	0.12			
AREA-AVERAGED Fp(INCH/HR) =	0.30	AREA-AVERAGED Ap =	0.42			
TOTAL AREA(ACRES) =	675.5	PEAK FLOW RATE(CFS) =	1060.46			

FLOW PROCESS FROM NODE 340.00 TO NODE 374.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	300.00	DOWNSTREAM(FEET) =	298.00
FLOW LENGTH(FEET) =	221.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 108.0 INCH PIPE IS	83.3 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	20.14		
ESTIMATED PIPE DIAMETER(INCH) =	108.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	1060.46		
PIPE TRAVEL TIME(MIN.) =	0.18	Tc(MIN.) =	22.43
LONGEST FLOWPATH FROM NODE	320.00	TO NODE	374.00 = 10946.00 FEET.

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 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	Ae (ACRES)	HEADWATER NODE
1	1041.06	17.33	2.222	0.30(0.12)	0.41	547.7	300.00
2	1060.46	22.43	1.913	0.30(0.12)	0.42	655.6	327.00
3	1042.73	23.47	1.863	0.30(0.13)	0.42	663.2	350.00
4	1014.55	24.79	1.800	0.30(0.13)	0.42	669.7	320.00
5	926.98	28.86	1.643	0.30(0.13)	0.42	675.5	306.00

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 374.00 = 10946.00 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	225.10	36.28	1.456	0.30(0.24)	0.79	195.1	390.00

LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

***** PEAK FLOW RATE TABLE *****

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1216.24	17.33	2.222	0.30(0.14)	0.47	640.9	300.00
2	1251.91	22.43	1.913	0.30(0.14)	0.47	776.3	327.00
3	1237.08	23.47	1.863	0.30(0.14)	0.48	789.4	350.00
4	1211.84	24.79	1.800	0.30(0.14)	0.48	803.0	320.00
5	1133.64	28.86	1.643	0.30(0.15)	0.49	830.7	306.00
6	1037.44	36.28	1.456	0.30(0.15)	0.50	870.6	390.00
TOTAL AREA(ACRES) =	870.6						

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) =	1251.91	Tc(MIN.) =	22.430
EFFECTIVE AREA(ACRES) =	776.26	AREA-AVERAGED Fm(INCH/HR) =	0.14
AREA-AVERAGED Fp(INCH/HR) =	0.30	AREA-AVERAGED Ap =	0.47
TOTAL AREA(ACRES) =	870.6		
LONGEST FLOWPATH FROM NODE	390.00	TO NODE	374.00 = 13836.00 FEET.

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<

FLOW PROCESS FROM NODE 374.00 TO NODE 380.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	298.00	DOWNSTREAM(FEET) =	261.00
FLOW LENGTH(FEET) =	1402.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 93.0 INCH PIPE IS	73.8 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	31.19		
ESTIMATED PIPE DIAMETER(INCH) =	93.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	1251.91		
PIPE TRAVEL TIME(MIN.) =	0.75	Tc(MIN.) =	23.18
LONGEST FLOWPATH FROM NODE	390.00	TO NODE	380.00 = 15238.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) =	870.6	Tc(MIN.) =	23.18
EFFECTIVE AREA(ACRES) =	776.26	AREA-AVERAGED Fm(INCH/HR) =	0.14
AREA-AVERAGED Fp(INCH/HR) =	0.30	AREA-AVERAGED Ap =	0.475
PEAK FLOW RATE(CFS) =	1251.91		

***** PEAK FLOW RATE TABLE *****

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1216.24	18.08	2.168	0.30(0.14)	0.47	640.9	300.00
2	1251.91	23.18	1.877	0.30(0.14)	0.47	776.3	327.00
3	1237.08	24.22	1.828	0.30(0.14)	0.48	789.4	350.00
4	1211.84	25.54	1.769	0.30(0.14)	0.48	803.0	320.00

5	1133.64	29.63	1.614	0.30	(0.15)	0.49	830.7	306.00
6	1037.44	37.07	1.437	0.30	(0.15)	0.50	870.6	390.00

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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 SUBAREA C ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 100-YR EV DECEMBER 2018 CCHI *

FILE NAME: PA3C00EV.DAT
TIME/DATE OF STUDY: 15:10 12/18/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 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 HIKE (FT) (FT) (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:

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) = 320.00
ELEVATION DATA: UPSTREAM(FEET) = 640.00 DOWNSTREAM(FEET) = 634.00

C-1

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.766
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.065

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	0.20	0.30	0.100	56	6.77
PUBLIC PARK	B	0.90	0.30	0.850	56	10.75
COMMERCIAL	B	0.30	0.30	0.100	56	6.77
PUBLIC PARK	B	1.90	0.30	0.850	56	10.75

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.736
SUBAREA RUNOFF(CFS) = 11.42
TOTAL AREA(ACRES) = 3.30 PEAK FLOW RATE(CFS) = 11.42

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) = 634.00 DOWNSTREAM ELEVATION(FEET) = 630.00
STREET LENGTH(FEET) = 503.00 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) = 25.63
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.55
HALFSTREET FLOOD WIDTH(FEET) = 21.45
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.98
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.63
STREET FLOW TRAVEL TIME(MIN.) = 2.81 Tc(MIN.) = 9.58

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.339
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.50	0.30	0.100	56
PUBLIC PARK	B	2.10	0.30	0.850	56
SCHOOL	B	4.60	0.30	0.600	56
COMMERCIAL	B	0.30	0.30	0.100	56
PUBLIC PARK	B	1.40	0.30	0.850	56
SCHOOL	B	1.10	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.647
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 28.30
EFFECTIVE AREA(ACRES) = 13.30 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) = 13.3 PEAK FLOW RATE(CFS) = 37.56

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END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.61 HALFSTREET FLOOD WIDTH(FEET) = 24.96
 FLOW VELOCITY(FEET/SEC.) = 3.26 DEPTH*VELOCITY(FT*FT/SEC.) = 1.98
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 823.00 FEET.

 FLOW PROCESS FROM NODE 302.00 TO NODE 302.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 9.58
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.339
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.00	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	9.30	0.30	0.200	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.30	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.276
 SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 35.16
 EFFECTIVE AREA(ACRES) = 25.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 25.3 PEAK FLOW RATE(CFS) = 72.72

C-2

 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) = 630.00 DOWNSTREAM(FEET) = 625.00
 FLOW LENGTH(FEET) = 651.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.79
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 72.72
 PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 10.69
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1474.00 FEET.

 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.69
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.138
 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
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.80	0.30	0.400	56

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SCHOOL	B	1.30	0.30	0.600	56
COMMERCIAL	B	0.60	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.480
 SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 13.74
 EFFECTIVE AREA(ACRES) = 30.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 30.4 PEAK FLOW RATE(CFS) = 81.90

 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.69
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.138
 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
SCHOOL	B	5.20	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.50	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.520
 SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 23.35
 EFFECTIVE AREA(ACRES) = 39.10 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 39.1 PEAK FLOW RATE(CFS) = 105.25

C-5

 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.69
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.138
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.80	0.30	0.100	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	7.40	0.30	0.200	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.50	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.215
 SUBAREA AREA(ACRES) = 11.40 SUBAREA RUNOFF(CFS) = 31.53
 EFFECTIVE AREA(ACRES) = 50.50 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.43
 TOTAL AREA(ACRES) = 50.5 PEAK FLOW RATE(CFS) = 136.78

C-4

 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

C-6

MAINLINE Tc(MIN.) = 10.69
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.138
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	4.70	0.30	0.100	56
PUBLIC PARK	B	2.30	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	4.90	0.30	0.200	56
COMMERCIAL	B	1.70	0.30	0.100	56
PUBLIC PARK	B	1.80	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	6.20	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.294
 SUBAREA AREA(ACRES) = 21.60 SUBAREA RUNOFF(CFS) = 59.29
 EFFECTIVE AREA(ACRES) = 72.10 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 72.1 PEAK FLOW RATE(CFS) = 196.07

 FLOW PROCESS FROM NODE 303.00 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) = 625.00 DOWNSTREAM(FEET) = 615.00
 FLOW LENGTH(FEET) = 1029.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.61
 ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 196.07
 PIPE TRAVEL TIME(MIN.) = 1.26 Tc(MIN.) = 11.95
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 305.00 = 2503.00 FEET.

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 11.95
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.946
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.10	0.30	0.100	56
PUBLIC PARK	B	1.80	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.00	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	5.00	0.30	0.400	56
COMMERCIAL	B	2.80	0.30	0.100	56
PUBLIC PARK	B	0.90	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.367
 SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 34.71
 EFFECTIVE AREA(ACRES) = 85.70 AREA-AVERAGED Fm(INCH/HR) = 0.12

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AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
 TOTAL AREA(ACRES) = 85.7 PEAK FLOW RATE(CFS) = 218.33

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 11.95
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.946
 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	1.80	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.20	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.280
 SUBAREA AREA(ACRES) = 3.00 SUBAREA RUNOFF(CFS) = 7.73
 EFFECTIVE AREA(ACRES) = 88.70 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
 TOTAL AREA(ACRES) = 88.7 PEAK FLOW RATE(CFS) = 226.06

C-7

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 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.) = 11.95
 RAINFALL INTENSITY(INCH/HR) = 2.95
 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.38
 EFFECTIVE STREAM AREA(ACRES) = 88.70
 TOTAL STREAM AREA(ACRES) = 88.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 226.06

 FLOW PROCESS FROM NODE 306.00 TO NODE 307.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 317.00
 ELEVATION DATA: UPSTREAM(FEET) = 646.00 DOWNSTREAM(FEET) = 645.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.296
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.562
 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.)
PUBLIC PARK	B	0.40	0.30	0.850	56	15.30
RESIDENTIAL						
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56	15.42

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PUBLIC PARK B 1.50 0.30 0.850 56 15.30
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.20 0.30 0.900 56 15.42
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.857
 SUBAREA RUNOFF(CFS) = 4.56
 TOTAL AREA (ACRES) = 2.20 PEAK FLOW RATE (CFS) = 4.56

 FLOW PROCESS FROM NODE 307.00 TO NODE 307.10 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 645.00 DOWNSTREAM ELEVATION(FEET) = 641.00
 STREET LENGTH(FEET) = 375.00 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

C-8.1

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) = 8.65
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.39
 HALFSTREET FLOOD WIDTH(FEET) = 12.93
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.56
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.01
 STREET FLOW TRAVEL TIME(MIN.) = 2.44 Tc(MIN.) = 17.73
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.356
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.00	0.30	0.600	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.40	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.649
 SUBAREA AREA(ACRES) = 4.20 SUBAREA RUNOFF(CFS) = 8.17
 EFFECTIVE AREA(ACRES) = 6.40 AREA-AVERAGED Fm(INCH/HR) = 0.22
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.72
 TOTAL AREA(ACRES) = 6.4 PEAK FLOW RATE(CFS) = 12.33

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 15.04
 FLOW VELOCITY(FEET/SEC.) = 2.78 DEPTH*VELOCITY(FT*FT/SEC.) = 1.20
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 307.10 = 692.00 FEET.

 FLOW PROCESS FROM NODE 307.10 TO NODE 308.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 641.00 DOWNSTREAM ELEVATION(FEET) = 635.00
 STREET LENGTH(FEET) = 506.00 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

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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) = 20.04
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.48
 HALFSTREET FLOOD WIDTH(FEET) = 17.93
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.27
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.58
 STREET FLOW TRAVEL TIME(MIN.) = 2.58 Tc(MIN.) = 20.31
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.182
 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
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.80	0.30	0.600	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.30	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.554
 SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 15.42
 EFFECTIVE AREA(ACRES) = 14.90 AREA-AVERAGED Fm(INCH/HR) = 0.19
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.63
 TOTAL AREA(ACRES) = 14.9 PEAK FLOW RATE(CFS) = 26.74

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 20.20
 FLOW VELOCITY(FEET/SEC.) = 3.49 DEPTH*VELOCITY(FT*FT/SEC.) = 1.82
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 308.00 = 1198.00 FEET.

 FLOW PROCESS FROM NODE 308.00 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) = 635.00 DOWNSTREAM(FEET) = 615.00
 FLOW LENGTH(FEET) = 1516.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.1 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 9.41
 ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 26.74
 PIPE TRAVEL TIME (MIN.) = 2.68 Tc (MIN.) = 23.00
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

 MAINLINE Tc (MIN.) = 23.00
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.034 C-10
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 1.20 0.30 0.100 56
 PUBLIC PARK B 0.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 2.20 0.30 0.200 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.80 0.30 0.600 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.50 0.30 0.400 56
 SCHOOL B 0.20 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.289
 SUBAREA AREA (ACRES) = 5.00 SUBAREA RUNOFF (CFS) = 8.76
 EFFECTIVE AREA (ACRES) = 19.90 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 19.9 PEAK FLOW RATE (CFS) = 33.52

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

 MAINLINE Tc (MIN.) = 23.00
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.034 C-10
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 1.20 0.30 0.100 56
 PUBLIC PARK B 0.20 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 2.30 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.30 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.00 0.30 0.600 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 6.60 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.415
 SUBAREA AREA (ACRES) = 14.60 SUBAREA RUNOFF (CFS) = 25.09
 EFFECTIVE AREA (ACRES) = 34.50 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49

TOTAL AREA (ACRES) = 34.5 PEAK FLOW RATE (CFS) = 58.61

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

 MAINLINE Tc (MIN.) = 23.00
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.034 C-10
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 SCHOOL B 0.20 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA (ACRES) = 0.20 SUBAREA RUNOFF (CFS) = 0.33
 EFFECTIVE AREA (ACRES) = 34.70 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 34.7 PEAK FLOW RATE (CFS) = 58.94

 FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION (MIN.) = 23.00
 RAINFALL INTENSITY (INCH/HR) = 2.03
 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.49
 EFFECTIVE STREAM AREA (ACRES) = 34.70
 TOTAL STREAM AREA (ACRES) = 34.70
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 58.94

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	226.06	11.95	2.946	0.30 (0.11)	0.38	88.7	300.00
2	58.94	23.00	2.034	0.30 (0.15)	0.49	34.7	306.00

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	271.49	11.95	2.946	0.30 (0.12)	0.40	106.7	300.00
2	212.17	23.00	2.034	0.30 (0.12)	0.41	123.4	306.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 271.49 Tc (MIN.) = 11.95
 EFFECTIVE AREA (ACRES) = 106.73 AREA-AVERAGED Fm (INCH/HR) = 0.12
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
 TOTAL AREA (ACRES) = 123.4
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 305.00 = 2714.00 FEET.


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*****
FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 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) = 480.00
FLOW LENGTH(FEET) = 2954.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.34
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 271.49
PIPE TRAVEL TIME(MIN.) = 1.87 Tc(MIN.) = 13.82
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 310.00 = 5668.00 FEET.

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*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 13.82
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.713
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp      Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           B      4.80    0.30    0.100  56
RESIDENTIAL
".4 DWELLING/ACRE"  B      0.40    0.30    0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B      0.20    0.30    0.600  56
COMMERCIAL           B      2.30    0.30    0.100  56
RESIDENTIAL
".4 DWELLING/ACRE"  B      0.10    0.30    0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.164
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 18.70
EFFECTIVE AREA(ACRES) = 114.53 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 131.2 PEAK FLOW RATE(CFS) = 271.49
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 13.82
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.713
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp      Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           B      0.10    0.30    0.100  56
PUBLIC PARK          B      0.20    0.30    0.850  56
PUBLIC PARK          B      2.30    0.30    0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      6.40    0.30    0.200  56
RESIDENTIAL

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"11+ DWELLINGS/ACRE" B      2.60    0.30    0.200  56
RESIDENTIAL
".4 DWELLING/ACRE"  B      0.70    0.30    0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.371
SUBAREA AREA(ACRES) = 12.30 SUBAREA RUNOFF(CFS) = 28.81
EFFECTIVE AREA(ACRES) = 126.83 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 143.5 PEAK FLOW RATE(CFS) = 296.64

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*****
FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 13.82
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.713
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"  B      2.20    0.30    0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B      0.10    0.30    0.600  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B      0.80    0.30    0.500  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B      10.20   0.30    0.500  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B      2.50    0.30    0.400  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B      3.70    0.30    0.400  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.514
SUBAREA AREA(ACRES) = 19.50 SUBAREA RUNOFF(CFS) = 44.92
EFFECTIVE AREA(ACRES) = 146.33 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.40
TOTAL AREA(ACRES) = 163.0 PEAK FLOW RATE(CFS) = 341.56

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*****
FLOW PROCESS FROM NODE 310.00 TO NODE 311.00 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) = 430.00
FLOW LENGTH(FEET) = 1056.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.01
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 341.56
PIPE TRAVEL TIME(MIN.) = 0.63 Tc(MIN.) = 14.45
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 311.00 = 6724.00 FEET.

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*****
FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 14.45
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.646
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B       1.60   0.30  0.100  56
COMMERCIAL          B       3.60   0.30  0.100  56
PUBLIC PARK         B       0.10   0.30  0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B       3.90   0.30  0.200  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B       5.10   0.30  0.200  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B       0.80   0.30  0.600  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.191
SUBAREA AREA(ACRES) = 15.10   SUBAREA RUNOFF(CFS) = 35.18
EFFECTIVE AREA(ACRES) = 161.43   AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 178.1   PEAK FLOW RATE(CFS) = 367.85

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*****
FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 14.45
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.646
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" B       6.70   0.30  0.600  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 6.70   SUBAREA RUNOFF(CFS) = 14.87
EFFECTIVE AREA(ACRES) = 168.13   AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 184.8   PEAK FLOW RATE(CFS) = 382.72

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*****
FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 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) = 430.00   DOWNSTREAM(FEET) = 373.00
FLOW LENGTH(FEET) = 1373.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.92
ESTIMATED PIPE DIAMETER(INCH) = 57.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 382.72
PIPE TRAVEL TIME(MIN.) = 0.82   Tc(MIN.) = 15.27
LONGEST FLOWPATH FROM NODE 306.00 TO NODE 312.00 = 8097.00 FEET.

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*****
FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.27
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.565
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B       1.50   0.30  0.100  56
COMMERCIAL          B       4.50   0.30  0.100  56
APARTMENTS         B       3.40   0.30  0.200  56
COMMERCIAL          B       0.30   0.30  0.100  56
PUBLIC PARK         B       0.10   0.30  0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B       0.20   0.30  0.900  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.157
SUBAREA AREA(ACRES) = 10.00   SUBAREA RUNOFF(CFS) = 22.66
EFFECTIVE AREA(ACRES) = 178.13   AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 194.8   PEAK FLOW RATE(CFS) = 393.07

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*****
FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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=====
MAINLINE Tc(MIN.) = 15.27
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.565
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" B       0.10   0.30  0.900  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B       0.40   0.30  0.500  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B       0.10   0.30  0.500  56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.567
SUBAREA AREA(ACRES) = 0.60   SUBAREA RUNOFF(CFS) = 1.29
EFFECTIVE AREA(ACRES) = 178.73   AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 195.4   PEAK FLOW RATE(CFS) = 394.36

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*****
FLOW PROCESS FROM NODE 312.00 TO NODE 339.00 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) = 373.00   DOWNSTREAM(FEET) = 301.00
FLOW LENGTH(FEET) = 1370.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.52
ESTIMATED PIPE DIAMETER(INCH) = 54.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 394.36
PIPE TRAVEL TIME(MIN.) = 0.75   Tc(MIN.) = 16.01

```

LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

FLOW PROCESS FROM NODE 390.00 TO NODE 391.00 IS CODE = 21

>>>>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

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/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER						
"CHAPARRAL,NARROWLEAF"	B	0.20	0.30	1.000	72	9.20
NATURAL FAIR COVER						
"OPEN BRUSH"	B	1.20	0.30	1.000	66	9.20

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF (CFS) = 3.93

TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 3.93

FLOW PROCESS FROM NODE 391.00 TO NODE 392.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

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) = 3.137

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"	B	1.70	0.30	1.000	72
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	0.60	0.30	1.000	72

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 6.87
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) = 5.87
EFFECTIVE AREA (ACRES) = 3.70 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 3.7 PEAK FLOW RATE (CFS) = 9.45

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.69 FLOW VELOCITY (FEET/SEC.) = 6.59
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 392.00 = 862.00 FEET.

FLOW PROCESS FROM NODE 392.00 TO NODE 393.00 IS CODE = 51

>>>>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) = 2.757

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	1.40	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	8.40	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.70	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	0.40	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	9.20	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 34.62

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.65

AVERAGE FLOW DEPTH (FEET) = 1.32 TRAVEL TIME (MIN.) = 2.74

Tc (MIN.) = 13.43

SUBAREA AREA (ACRES) = 22.70 SUBAREA RUNOFF (CFS) = 50.20

EFFECTIVE AREA (ACRES) = 26.40 AREA-AVERAGED Fm (INCH/HR) = 0.30

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 26.4 PEAK FLOW RATE (CFS) = 58.38

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.61 FLOW VELOCITY (FEET/SEC.) = 7.55
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<<<<<

OC-1

OC-2

OC-3

>>>>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

OC-4

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.535
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 1.60 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 5.50 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 1.80 0.30 1.000 66
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.60 0.30 1.000 65
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 1.00 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 6.80 0.30 1.000 72
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 75.79
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.02
AVERAGE FLOW DEPTH(FEET) = 1.90 TRAVEL TIME(MIN.) = 2.15
Tc(MIN.) = 15.58
SUBAREA AREA(ACRES) = 17.30 SUBAREA RUNOFF(CFS) = 34.80
EFFECTIVE AREA(ACRES) = 43.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 43.7 PEAK FLOW RATE(CFS) = 87.91

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.01 FLOW VELOCITY(FEET/SEC.) = 7.26
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.) = 15.58
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.535
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" B 2.50 0.30 1.000 66
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.10 0.30 1.000 65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 5.23
EFFECTIVE AREA(ACRES) = 46.30 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 46.3 PEAK FLOW RATE(CFS) = 93.14

OC-4

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) = 664.00 CHANNEL SLOPE = 0.0377
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) = 2.409

OC-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 6.30 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 5.90 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 6.80 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 0.90 0.30 0.900 56
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.50 0.30 1.000 65
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 0.20 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.996
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 112.70
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.50
AVERAGE FLOW DEPTH(FEET) = 2.24 TRAVEL TIME(MIN.) = 1.48
Tc(MIN.) = 17.06
SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 39.12
EFFECTIVE AREA(ACRES) = 66.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 66.9 PEAK FLOW RATE(CFS) = 126.98

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.34 FLOW VELOCITY(FEET/SEC.) = 7.73
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 395.00 = 3523.00 FEET.

FLOW PROCESS FROM NODE 395.00 TO NODE 395.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 17.06
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.409
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,NARROWLEAF" B 12.60 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 3.10 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 2.40 0.30 0.900 56
NATURAL FAIR COVER

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"WOODLAND,GRASS" B 0.10 0.30 1.000 65
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.987
 SUBAREA AREA (ACRES) = 18.20 SUBAREA RUNOFF (CFS) = 34.60
 EFFECTIVE AREA (ACRES) = 85.10 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 85.1 PEAK FLOW RATE (CFS) = 161.58

 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) = 389.00
 FLOW LENGTH (FEET) = 5717.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.5 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 20.24
 ESTIMATED PIPE DIAMETER (INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 161.58
 PIPE TRAVEL TIME (MIN.) = 4.71 Tc (MIN.) = 21.76
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 370.00 = 9240.00 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) = 389.00 DOWNSTREAM (FEET) = 345.00
 CHANNEL LENGTH THRU SUBAREA (FEET) = 1996.00 CHANNEL SLOPE = 0.0220
 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) = 1.873

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	2.90	0.30	1.000	69
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	4.40	0.30	1.000	63
COMMERCIAL	B	0.50	0.30	0.100	56
NATURAL FAIR COVER					
"GRASS"	B	6.60	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.60	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	6.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.956
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 178.80
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.89
 AVERAGE FLOW DEPTH (FEET) = 2.94 TRAVEL TIME (MIN.) = 4.83
 Tc (MIN.) = 26.59
 SUBAREA AREA (ACRES) = 24.10 SUBAREA RUNOFF (CFS) = 34.41
 EFFECTIVE AREA (ACRES) = 109.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
 TOTAL AREA (ACRES) = 109.2 PEAK FLOW RATE (CFS) = 161.58

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 2.83 FLOW VELOCITY (FEET/SEC.) = 6.71
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 371.00 = 11236.00 FEET.

 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.) = 26.59
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 1.873
 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	1.10	0.30	1.000	63
COMMERCIAL	B	1.10	0.30	0.100	56
NATURAL FAIR COVER					
"GRASS"	B	2.00	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.40	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.830
 SUBAREA AREA (ACRES) = 7.10 SUBAREA RUNOFF (CFS) = 10.38
 EFFECTIVE AREA (ACRES) = 116.30 AREA-AVERAGED Fm (INCH/HR) = 0.29
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
 TOTAL AREA (ACRES) = 116.3 PEAK FLOW RATE (CFS) = 165.36

 FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 26.59
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 1.873
 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	0.70	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.20	0.30	1.000	65
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	3.00	0.30	1.000	65
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.40	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.975
 SUBAREA AREA (ACRES) = 5.50 SUBAREA RUNOFF (CFS) = 7.82

C-50

C-50

C-50

EFFECTIVE AREA(ACRES) = 121.80 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
TOTAL AREA(ACRES) = 121.8 PEAK FLOW RATE(CFS) = 173.18

FLOW PROCESS FROM NODE 371.00 TO NODE 371.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 26.59
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.873
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" B 1.40 0.30 0.900 56
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.10 0.30 1.000 65
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.907
SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 2.16
EFFECTIVE AREA(ACRES) = 123.30 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
TOTAL AREA(ACRES) = 123.3 PEAK FLOW RATE(CFS) = 175.34

C-50

FLOW PROCESS FROM NODE 371.00 TO NODE 372.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 345.00 DOWNSTREAM(FEET) = 301.00
FLOW LENGTH(FEET) = 488.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.51
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 175.34
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 26.86
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 372.00 = 11724.00 FEET.

FLOW PROCESS FROM NODE 372.00 TO NODE 373.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM(FEET) = 301.00 DOWNSTREAM(FEET) = 300.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 924.00 CHANNEL SLOPE = 0.0011
GIVEN CHANNEL BASE(FEET) = 30.00 CHANNEL FREEBOARD(FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
*ESTIMATED CHANNEL HEIGHT(FEET) = 3.31

C-60

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.658
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 32.30 0.30 0.100 56
COMMERCIAL B 2.70 0.30 0.100 56
COMMERCIAL B 0.60 0.30 0.100 56

COMMERCIAL B 1.80 0.30 0.100 56
PUBLIC PARK B 7.20 0.30 0.850 56
PUBLIC PARK B 9.80 0.30 0.850 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.334
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 213.47
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.51
AVERAGE FLOW DEPTH(FEET) = 2.31 TRAVEL TIME(MIN.) = 6.14
Tc(MIN.) = 33.01

SUBAREA AREA(ACRES) = 54.40 SUBAREA RUNOFF(CFS) = 76.24
EFFECTIVE AREA(ACRES) = 177.70 AREA-AVERAGED Fm(INCH/HR) = 0.23
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.78
TOTAL AREA(ACRES) = 177.7 PEAK FLOW RATE(CFS) = 227.67
GIVEN CHANNEL BASE(FEET) = 30.00 CHANNEL FREEBOARD(FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
*ESTIMATED CHANNEL HEIGHT(FEET) = 3.39

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.39 FLOW VELOCITY(FEET/SEC.) = 2.56
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 373.00 = 12648.00 FEET.

FLOW PROCESS FROM NODE 373.00 TO NODE 373.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 33.01
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.658
SUBAREA LOSS RATE DATA(AMC II):

C-60

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 2.60 0.30 0.850 56
PUBLIC PARK B 2.10 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.50 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.80 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 3.60 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.886
SUBAREA AREA(ACRES) = 17.40 SUBAREA RUNOFF(CFS) = 21.79
EFFECTIVE AREA(ACRES) = 195.10 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.79
TOTAL AREA(ACRES) = 195.1 PEAK FLOW RATE(CFS) = 249.46

FLOW PROCESS FROM NODE 373.00 TO NODE 374.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 300.00 DOWNSTREAM(FEET) = 298.00
FLOW LENGTH(FEET) = 1188.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 87.0 INCH PIPE IS 65.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.50

ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 249.46
PIPE TRAVEL TIME(MIN.) = 2.64 Tc(MIN.) = 35.65
LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

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) = 622.00 DOWNSTREAM(FEET) = 621.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.511
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.168

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.)
APARTMENTS	B	1.50	0.30	0.200	56	10.51
APARTMENTS	B	2.00	0.30	0.200	56	10.51

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200

SUBAREA RUNOFF(CFS) = 9.79

TOTAL AREA(ACRES) = 3.50 PEAK FLOW RATE(CFS) = 9.79

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) = 621.00 DOWNSTREAM ELEVATION(FEET) = 612.00
STREET LENGTH(FEET) = 569.00 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) = 16.41

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.44

HALFSTREET FLOOD WIDTH(FEET) = 15.59

AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.47

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.53

STREET FLOW TRAVEL TIME(MIN.) = 2.73 Tc(MIN.) = 13.24

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.779

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
APARTMENTS	B	2.20	0.30	0.200	56
APARTMENTS	B	3.20	0.30	0.200	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200

SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 13.22

EFFECTIVE AREA(ACRES) = 8.90 AREA-AVERAGED Fm(INCH/HR) = 0.06

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.20

TOTAL AREA(ACRES) = 8.9 PEAK FLOW RATE(CFS) = 21.78

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.54

FLOW VELOCITY(FEET/SEC.) = 3.70 DEPTH*VELOCITY(FT*FT/SEC.) = 1.76

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 322.00 = 899.00 FEET.

FLOW PROCESS FROM NODE 322.00 TO NODE 324.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 612.00 DOWNSTREAM ELEVATION(FEET) = 590.00
STREET LENGTH(FEET) = 891.00 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) = 34.38

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.51

HALFSTREET FLOOD WIDTH(FEET) = 19.26

AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.90

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.48

STREET FLOW TRAVEL TIME(MIN.) = 3.03 Tc(MIN.) = 16.27

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.474

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	3.00	0.30	0.400	56
RESIDENTIAL					

C-16

C-15

C-17

"8-10 DWELLINGS/ACRE" B 5.70 0.30 0.400 56
 CONDOMINIUMS B 1.20 0.30 0.350 56
 PUBLIC PARK B 0.30 0.30 0.850 56
 PUBLIC PARK B 0.90 0.30 0.850 56
 COMMERCIAL B 0.80 0.30 0.100 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.420
 SUBAREA AREA(ACRES) = 11.90 SUBAREA RUNOFF(CFS) = 25.14
 EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.33
 TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 44.47

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 21.37
 FLOW VELOCITY(FEET/SEC.) = 5.21 DEPTH*VELOCITY(FT*FT/SEC.) = 2.83
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 324.00 = 1790.00 FEET.

 FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 16.27
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.474
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 1.70 0.30 0.100 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.70 SUBAREA RUNOFF(CFS) = 3.74
 EFFECTIVE AREA(ACRES) = 22.50 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
 TOTAL AREA(ACRES) = 22.5 PEAK FLOW RATE(CFS) = 48.21

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 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) = 590.00 DOWNSTREAM(FEET) = 575.00
 FLOW LENGTH(FEET) = 529.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.18
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 48.21
 PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 16.89
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 325.00 = 2319.00 FEET.

 FLOW PROCESS FROM NODE 324.00 TO NODE 324.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 16.89
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.422
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 0.50 0.30 0.100 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.30 0.30 0.600 56
 COMMERCIAL B 0.30 0.30 0.100 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 2.10 0.30 0.600 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.544
 SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 14.63
 EFFECTIVE AREA(ACRES) = 29.70 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.37
 TOTAL AREA(ACRES) = 29.7 PEAK FLOW RATE(CFS) = 61.80

C-18

 FLOW PROCESS FROM NODE 325.00 TO NODE 325.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 16.89
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.422
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 0.10 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.80 0.30 0.600 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 10.20 0.30 0.600 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.606
 SUBAREA AREA(ACRES) = 15.30 SUBAREA RUNOFF(CFS) = 30.84
 EFFECTIVE AREA(ACRES) = 45.00 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 45.0 PEAK FLOW RATE(CFS) = 92.64

C-18

 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) = 575.00 DOWNSTREAM(FEET) = 515.00
 FLOW LENGTH(FEET) = 284.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 35.70
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 92.64
 PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 17.03
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 326.00 = 2603.00 FEET.

 FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<


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=====
MAINLINE Tc(MIN.) = 17.03
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.411
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B       0.70   0.30   0.100  56
PUBLIC PARK         B       0.10   0.30   0.850  56
RESIDENTIAL
".4 DWELLING/ACRE" B       0.80   0.30   0.900  56
COMMERCIAL          B       1.40   0.30   0.100  56
RESIDENTIAL
".4 DWELLING/ACRE" B       2.30   0.30   0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B       0.10   0.30   0.600  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.582
SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 10.87
EFFECTIVE AREA(ACRES) = 50.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 50.4 PEAK FLOW RATE(CFS) = 103.08

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C-14

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FLOW PROCESS FROM NODE 326.00 TO NODE 326.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.03
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.411
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B       2.10   0.30   0.100  56
RESIDENTIAL
".4 DWELLING/ACRE" B       2.80   0.30   0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.557
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 9.90
EFFECTIVE AREA(ACRES) = 55.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 55.3 PEAK FLOW RATE(CFS) = 112.97

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C-14

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FLOW PROCESS FROM NODE 326.00 TO NODE 333.00 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) = 515.00 DOWNSTREAM(FEET) = 500.00
FLOW LENGTH(FEET) = 1644.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.66
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 112.97
PIPE TRAVEL TIME(MIN.) = 2.35 Tc(MIN.) = 19.38
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

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FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 19.38
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.241
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B       0.40   0.30   0.100  56
RESIDENTIAL
".4 DWELLING/ACRE" B       2.20   0.30   0.900  56
COMMERCIAL          B       1.80   0.30   0.100  56
RESIDENTIAL
".4 DWELLING/ACRE" B       0.30   0.30   0.900  56
COMMERCIAL          B       5.60   0.30   0.100  56
RESIDENTIAL
".4 DWELLING/ACRE" B       4.10   0.30   0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.467
SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 27.23
EFFECTIVE AREA(ACRES) = 69.70 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 69.7 PEAK FLOW RATE(CFS) = 131.73

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C-20

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FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 19.38
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.241
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" B       0.20   0.30   0.600  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.37
EFFECTIVE AREA(ACRES) = 69.90 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 69.9 PEAK FLOW RATE(CFS) = 132.10

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FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 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.) = 19.38
RAINFALL INTENSITY(INCH/HR) = 2.24
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.47
EFFECTIVE STREAM AREA(ACRES) = 69.90
TOTAL STREAM AREA(ACRES) = 69.90

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PEAK FLOW RATE(CFS) AT CONFLUENCE = 132.10

FLOW PROCESS FROM NODE 327.00 TO NODE 327.50 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) = 615.00 DOWNSTREAM(FEET) = 614.00

Tc = K*(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.844
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.287
SUBAREA Tc AND LOSS RATE DATA(AMC II):

Table with 7 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN, Tc (MIN.). Rows include COMMERCIAL, PUBLIC PARK, RESIDENTIAL, and "8-10 DWELLINGS/ACRE".

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.383
SUBAREA RUNOFF(CFS) = 2.57
TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 2.57

FLOW PROCESS FROM NODE 327.50 TO NODE 328.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 614.00 DOWNSTREAM ELEVATION(FEET) = 610.00
STREET LENGTH(FEET) = 425.00 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) = 6.49
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.37
HALFSTREET FLOOD WIDTH(FEET) = 11.68
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.30
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.85
STREET FLOW TRAVEL TIME(MIN.) = 3.08 Tc(MIN.) = 12.93

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.817
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN

C-21.1

COMMERCIAL B 1.00 0.30 0.100 56
PUBLIC PARK B 0.30 0.30 0.850 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56
COMMERCIAL B 0.90 0.30 0.100 56
PUBLIC PARK B 0.60 0.30 0.850 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.348
SUBAREA AREA (ACRES) = 3.20 SUBAREA RUNOFF(CFS) = 7.81
EFFECTIVE AREA(ACRES) = 4.10 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
TOTAL AREA (ACRES) = 4.1 PEAK FLOW RATE (CFS) = 10.00

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 14.10
FLOW VELOCITY(FEET/SEC.) = 2.54 DEPTH*VELOCITY(FT*FT/SEC.) = 1.05
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 328.00 = 754.00 FEET.

FLOW PROCESS FROM NODE 328.00 TO NODE 329.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 610.00 DOWNSTREAM ELEVATION(FEET) = 595.00
STREET LENGTH(FEET) = 366.00 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) = 17.25
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 13.01
AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.06
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.00
STREET FLOW TRAVEL TIME(MIN.) = 1.21 Tc(MIN.) = 14.13
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.679

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN
COMMERCIAL B 0.10 0.30 0.100 56
PUBLIC PARK B 0.20 0.30 0.850 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 3.10 0.30 0.400 56
COMMERCIAL B 0.50 0.30 0.100 56
PUBLIC PARK B 0.30 0.30 0.850 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 2.10 0.30 0.400 56

C-21

C-22

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.407
 SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 14.50
 EFFECTIVE AREA(ACRES) = 10.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 10.4 PEAK FLOW RATE(CFS) = 23.99

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 14.96
 FLOW VELOCITY(FEET/SEC.) = 5.47 DEPTH*VELOCITY(FT*FT/SEC.) = 2.35
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 329.00 = 1120.00 FEET.

 FLOW PROCESS FROM NODE 329.00 TO NODE 329.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 14.13
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.679
 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	2.80	0.30	0.400	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	6.10	0.30	0.400	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.402
 SUBAREA AREA(ACRES) = 9.00 SUBAREA RUNOFF(CFS) = 20.72
 EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 44.71

C-23

 FLOW PROCESS FROM NODE 329.00 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) = 595.00 DOWNSTREAM(FEET) = 575.00
 FLOW LENGTH(FEET) = 378.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.80
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 44.71
 PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 14.49
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 330.00 = 1498.00 FEET.

 FLOW PROCESS FROM NODE 330.00 TO NODE 330.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 14.49
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.642
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.90	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.50	0.30	0.400	56
COMMERCIAL	B	0.60	0.30	0.100	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	10.20	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.90	0.30	0.400	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.561
 SUBAREA AREA(ACRES) = 19.20 SUBAREA RUNOFF(CFS) = 42.74
 EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 86.80

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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) = 575.00 DOWNSTREAM(FEET) = 555.00
 FLOW LENGTH(FEET) = 457.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.75
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 86.80
 PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 14.87
 LONGEST FLOWPATH FROM NODE 327.00 TO NODE 331.00 = 1955.00 FEET.

 FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 14.87
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.603
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.10	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.80	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	10.50	0.30	0.600	56
COMMERCIAL	B	0.30	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	13.70	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.619
 SUBAREA AREA(ACRES) = 26.90 SUBAREA RUNOFF(CFS) = 58.51
 EFFECTIVE AREA(ACRES) = 65.50 AREA-AVERAGED Fm(INCH/HR) = 0.16

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AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA (ACRES) = 65.5 PEAK FLOW RATE (CFS) = 143.95

FLOW PROCESS FROM NODE 331.00 TO NODE 332.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM (FEET) = 555.00 DOWNSTREAM (FEET) = 520.00
FLOW LENGTH (FEET) = 324.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.9 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 31.29
ESTIMATED PIPE DIAMETER (INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 143.95
PIPE TRAVEL TIME (MIN.) = 0.17 Tc (MIN.) = 15.05
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 332.00 = 2279.00 FEET.

FLOW PROCESS FROM NODE 332.00 TO NODE 332.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 15.05
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.586

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.10	0.30	0.900	56
COMMERCIAL	B	3.70	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	5.00	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.621
SUBAREA AREA (ACRES) = 10.90 SUBAREA RUNOFF (CFS) = 23.54
EFFECTIVE AREA (ACRES) = 76.40 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
TOTAL AREA (ACRES) = 76.4 PEAK FLOW RATE (CFS) = 166.49

FLOW PROCESS FROM NODE 332.00 TO NODE 333.00 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) = 500.00
FLOW LENGTH (FEET) = 1740.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 13.79
ESTIMATED PIPE DIAMETER (INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 166.49
PIPE TRAVEL TIME (MIN.) = 2.10 Tc (MIN.) = 17.15
LONGEST FLOWPATH FROM NODE 327.00 TO NODE 333.00 = 4019.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 17.15

* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.401

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	1.20	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	4.40	0.30	0.900	56
COMMERCIAL	B	3.90	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	9.80	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.689
SUBAREA AREA (ACRES) = 19.30 SUBAREA RUNOFF (CFS) = 38.12
EFFECTIVE AREA (ACRES) = 95.70 AREA-AVERAGED Fm (INCH/HR) = 0.17
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.58
TOTAL AREA (ACRES) = 95.7 PEAK FLOW RATE (CFS) = 191.93

FLOW PROCESS FROM NODE 333.00 TO NODE 333.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 17.15
RAINFALL INTENSITY (INCH/HR) = 2.40
AREA-AVERAGED Fm (INCH/HR) = 0.17
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.58
EFFECTIVE STREAM AREA (ACRES) = 95.70
TOTAL STREAM AREA (ACRES) = 95.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 191.93

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	132.10	19.38	2.241	0.30 (0.14)	0.47	69.9	320.00
2	191.93	17.15	2.401	0.30 (0.17)	0.58	95.7	327.00

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	317.78	17.15	2.401	0.30 (0.16)	0.53	157.6	327.00
2	310.23	19.38	2.241	0.30 (0.16)	0.53	165.6	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 317.78 Tc (MIN.) = 17.15
EFFECTIVE AREA (ACRES) = 157.57 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA (ACRES) = 165.6

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LONGEST FLOWPATH FROM NODE 320.00 TO NODE 333.00 = 4247.00 FEET.

FLOW PROCESS FROM NODE 333.00 TO NODE 334.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 500.00 DOWNSTREAM(FEET) = 468.00
FLOW LENGTH(FEET) = 819.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 38.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.08
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 317.78
PIPE TRAVEL TIME(MIN.) = 0.52 Tc(MIN.) = 17.67
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 17.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.361

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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 APARTMENTS, COMMERCIAL, PUBLIC PARK, RESIDENTIAL.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.310
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 27.76
EFFECTIVE AREA(ACRES) = 171.17 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 179.2 PEAK FLOW RATE(CFS) = 339.79

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 17.67
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.361

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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.

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.330
SUBAREA AREA(ACRES) = 5.70 SUBAREA RUNOFF(CFS) = 11.60
EFFECTIVE AREA(ACRES) = 176.87 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 184.9 PEAK FLOW RATE(CFS) = 351.39

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 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.) = 17.67
RAINFALL INTENSITY(INCH/HR) = 2.36
AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.51
EFFECTIVE STREAM AREA(ACRES) = 176.87
TOTAL STREAM AREA(ACRES) = 184.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 351.39

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FLOW PROCESS FROM NODE 350.00 TO NODE 351.00 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) = 495.00 DOWNSTREAM(FEET) = 492.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.730
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.131
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
"3-4 DWELLINGS/ACRE" B 0.80 0.30 0.600 56 10.73
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.70 0.30 0.600 56 10.73
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA RUNOFF(CFS) = 6.64
TOTAL AREA(ACRES) = 2.50 PEAK FLOW RATE(CFS) = 6.64

FLOW PROCESS FROM NODE 351.00 TO NODE 352.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 492.00 DOWNSTREAM ELEVATION(FEET) = 488.00
STREET LENGTH(FEET) = 456.00 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

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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) = 10.76
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 14.80
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.50
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.07
STREET FLOW TRAVEL TIME(MIN.) = 3.04 Tc(MIN.) = 13.77

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.719
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" B 3.20 0.30 0.600 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.40 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 8.23
EFFECTIVE AREA(ACRES) = 6.10 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 6.1 PEAK FLOW RATE(CFS) = 13.94

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 16.45
FLOW VELOCITY(FEET/SEC.) = 2.67 DEPTH*VELOCITY(FT*FT/SEC.) = 1.22
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 352.00 = 786.00 FEET.

FLOW PROCESS FROM NODE 352.00 TO NODE 353.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 488.00 DOWNSTREAM(FEET) = 485.00
FLOW LENGTH(FEET) = 883.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.80
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.94
PIPE TRAVEL TIME(MIN.) = 3.07 Tc(MIN.) = 16.83
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 353.00 = 1669.00 FEET.

FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.83
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.427
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

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LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.50 0.30 0.600 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 1.10 0.30 0.400 56
PUBLIC PARK B 0.10 0.30 0.850 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.60 0.30 0.600 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 4.50 0.30 0.400 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.70 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.471
SUBAREA AREA(ACRES) = 8.50 SUBAREA RUNOFF(CFS) = 17.48
EFFECTIVE AREA(ACRES) = 14.60 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 29.82

FLOW PROCESS FROM NODE 353.00 TO NODE 353.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.83
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.427
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 0.30 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.62
EFFECTIVE AREA(ACRES) = 14.90 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 14.9 PEAK FLOW RATE(CFS) = 30.44

FLOW PROCESS FROM NODE 353.00 TO NODE 334.00 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) = 468.00
FLOW LENGTH(FEET) = 1136.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.14
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 30.44
PIPE TRAVEL TIME(MIN.) = 1.87 Tc(MIN.) = 18.70
LONGEST FLOWPATH FROM NODE 350.00 TO NODE 334.00 = 2805.00 FEET.

FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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MAINLINE Tc(MIN.) = 18.70
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.286
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.90	0.30	0.100	56
PUBLIC PARK	B	2.00	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.40	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.50	0.30	0.400	56
COMMERCIAL	B	0.50	0.30	0.100	56
PUBLIC PARK	B	1.50	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512
 SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 14.97
 EFFECTIVE AREA(ACRES) = 22.70 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 22.7 PEAK FLOW RATE(CFS) = 43.53

 FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.70
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.286
 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	3.10	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.40	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.262
 SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 8.94
 EFFECTIVE AREA(ACRES) = 27.20 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 27.2 PEAK FLOW RATE(CFS) = 52.47

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 FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.70
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.286
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.20	0.30	0.600	56
PUBLIC PARK	B	2.70	0.30	0.850	56
RESIDENTIAL					

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".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	7.30	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.674
 SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 22.51
 EFFECTIVE AREA(ACRES) = 39.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 39.2 PEAK FLOW RATE(CFS) = 74.98

 FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.70
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.286
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
SCHOOL	B	3.10	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.626
 SUBAREA AREA(ACRES) = 3.80 SUBAREA RUNOFF(CFS) = 7.18
 EFFECTIVE AREA(ACRES) = 43.00 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 43.0 PEAK FLOW RATE(CFS) = 82.15

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 FLOW PROCESS FROM NODE 334.00 TO NODE 334.00 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.) = 18.70
 RAINFALL INTENSITY(INCH/HR) = 2.29
 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.54
 EFFECTIVE STREAM AREA(ACRES) = 43.00
 TOTAL STREAM AREA(ACRES) = 43.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 82.15

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	351.39	17.67	2.361	0.30(0.15)	0.51	176.9	327.00
1	341.79	19.91	2.207	0.30(0.15)	0.51	184.9	320.00
2	82.15	18.70	2.286	0.30(0.16)	0.54	43.0	350.00

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	431.75	17.67	2.361	0.30(0.16)	0.52	217.5	327.00
2	429.14	18.70	2.286	0.30(0.15)	0.52	223.6	350.00
3	420.85	19.91	2.207	0.30(0.15)	0.52	227.9	320.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 431.75 Tc(MIN.) = 17.67
 EFFECTIVE AREA(ACRES) = 217.51 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 227.9
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 334.00 = 5066.00 FEET.

 FLOW PROCESS FROM NODE 334.00 TO NODE 335.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 468.00 DOWNSTREAM(FEET) = 422.00
 FLOW LENGTH(FEET) = 1086.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 45.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.52
 ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 431.75
 PIPE TRAVEL TIME(MIN.) = 0.63 Tc(MIN.) = 18.31
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 335.00 = 6152.00 FEET.

 FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

MAINLINE Tc(MIN.) = 18.31
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.314
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.00	0.30	0.100	56
COMMERCIAL	B	4.20	0.30	0.100	56
PUBLIC PARK	B	0.60	0.30	0.850	56
PUBLIC PARK	B	10.80	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.00	0.30	0.900	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	3.90	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.631
 SUBAREA AREA(ACRES) = 23.50 SUBAREA RUNOFF(CFS) = 44.94
 EFFECTIVE AREA(ACRES) = 241.01 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 251.4 PEAK FLOW RATE(CFS) = 467.55

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 FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 18.31
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.314
 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	0.10	0.30	0.600	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	9.20	0.30	0.500	56
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	0.70	0.30	0.400	56
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	2.90	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.474
 SUBAREA AREA(ACRES) = 13.10 SUBAREA RUNOFF(CFS) = 25.60
 EFFECTIVE AREA(ACRES) = 254.11 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 264.5 PEAK FLOW RATE(CFS) = 493.16

 FLOW PROCESS FROM NODE 335.00 TO NODE 336.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 422.00 DOWNSTREAM(FEET) = 380.00
 FLOW LENGTH(FEET) = 780.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 46.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 32.17
 ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 493.16
 PIPE TRAVEL TIME(MIN.) = 0.40 Tc(MIN.) = 18.71
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 336.00 = 6932.00 FEET.

 FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

MAINLINE Tc(MIN.) = 18.71
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.286
 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	B	0.60	0.30	0.100	56
COMMERCIAL	B	1.60	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	3.70	0.30	0.200	56
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	5.60	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

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SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.182
SUBAREA AREA (ACRES) = 12.30 SUBAREA RUNOFF (CFS) = 24.70
EFFECTIVE AREA (ACRES) = 266.41 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA (ACRES) = 276.8 PEAK FLOW RATE (CFS) = 511.36

FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 18.71
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.286
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" B 0.20 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.50 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.60 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.40 0.30 0.600 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 16.80 0.30 0.600 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.70 0.30 0.400 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.611
SUBAREA AREA (ACRES) = 22.20 SUBAREA RUNOFF (CFS) = 42.00
EFFECTIVE AREA (ACRES) = 288.61 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA (ACRES) = 299.0 PEAK FLOW RATE (CFS) = 553.36

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FLOW PROCESS FROM NODE 336.00 TO NODE 336.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 18.71
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.286
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 6.30 0.30 0.400 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.400
SUBAREA AREA (ACRES) = 6.30 SUBAREA RUNOFF (CFS) = 12.28
EFFECTIVE AREA (ACRES) = 294.91 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA (ACRES) = 305.3 PEAK FLOW RATE (CFS) = 565.64

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FLOW PROCESS FROM NODE 336.00 TO NODE 337.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM (FEET) = 380.00 DOWNSTREAM (FEET) = 350.00
FLOW LENGTH (FEET) = 803.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 49.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 29.40
ESTIMATED PIPE DIAMETER (INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 565.64
PIPE TRAVEL TIME (MIN.) = 0.46 Tc (MIN.) = 19.17
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 337.00 = 7735.00 FEET.

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.17
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.255
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 B 3.00 0.30 0.200 56
COMMERCIAL B 1.30 0.30 0.100 56
COMMERCIAL B 2.70 0.30 0.100 56
COMMERCIAL B 6.00 0.30 0.100 56
PUBLIC PARK B 1.30 0.30 0.850 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.189
SUBAREA AREA (ACRES) = 14.70 SUBAREA RUNOFF (CFS) = 29.08
EFFECTIVE AREA (ACRES) = 309.61 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 320.0 PEAK FLOW RATE (CFS) = 586.52

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FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.17
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.255
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 3.30 0.30 0.850 56
PUBLIC PARK B 1.50 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 2.50 0.30 0.200 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 6.70 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.20 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.488
SUBAREA AREA (ACRES) = 16.30 SUBAREA RUNOFF (CFS) = 30.93
EFFECTIVE AREA (ACRES) = 325.91 AREA-AVERAGED Fm (INCH/HR) = 0.15

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AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 336.3 PEAK FLOW RATE (CFS) = 617.44

FLOW PROCESS FROM NODE 337.00 TO NODE 337.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.17
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.255

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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					
"3-4 DWELLINGS/ACRE"	B	0.60	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.60	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.90	0.30	0.400	56
SCHOOL	B	0.20	0.30	0.600	56
SCHOOL	B	5.90	0.30	0.600	56
SCHOOL	B	6.00	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.526
SUBAREA AREA (ACRES) = 20.20 SUBAREA RUNOFF (CFS) = 38.12
EFFECTIVE AREA (ACRES) = 346.11 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 356.5 PEAK FLOW RATE (CFS) = 655.56

FLOW PROCESS FROM NODE 337.00 TO NODE 338.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM (FEET) = 350.00 DOWNSTREAM (FEET) = 332.00
FLOW LENGTH (FEET) = 838.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 61.4 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 24.40
ESTIMATED PIPE DIAMETER (INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 655.56
PIPE TRAVEL TIME (MIN.) = 0.57 Tc (MIN.) = 19.74
LONGEST FLOWPATH FROM NODE 320.00 TO NODE 338.00 = 8573.00 FEET.

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.74
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.217

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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
APARTMENTS	B	6.90	0.30	0.200	56
COMMERCIAL	B	1.40	0.30	0.100	56
COMMERCIAL	B	1.90	0.30	0.100	56
COMMERCIAL	B	5.90	0.30	0.100	56

RESIDENTIAL
"11+ DWELLINGS/ACRE" B 3.60 0.30 0.200 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.154
SUBAREA AREA (ACRES) = 19.80 SUBAREA RUNOFF (CFS) = 38.69
EFFECTIVE AREA (ACRES) = 365.91 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA (ACRES) = 376.3 PEAK FLOW RATE (CFS) = 682.65

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.74
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.217

C-41

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	1.60	0.30	0.200	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA (ACRES) = 1.60					
SUBAREA RUNOFF (CFS) = 3.11					
EFFECTIVE AREA (ACRES) = 367.51					
AREA-AVERAGED Fm (INCH/HR) = 0.14					
AREA-AVERAGED Fp (INCH/HR) = 0.30					
AREA-AVERAGED Ap = 0.48					
TOTAL AREA (ACRES) = 377.9					
PEAK FLOW RATE (CFS) = 685.76					

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.74
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.217

C-41

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	2.10	0.30	0.100	56
COMMERCIAL	B	8.50	0.30	0.100	56
COMMERCIAL	B	1.90	0.30	0.100	56
COMMERCIAL	B	0.70	0.30	0.100	56
PUBLIC PARK	B	2.60	0.30	0.850	56
PUBLIC PARK	B	0.60	0.30	0.850	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.246					
SUBAREA AREA (ACRES) = 16.40					
SUBAREA RUNOFF (CFS) = 31.64					
EFFECTIVE AREA (ACRES) = 383.91					
AREA-AVERAGED Fm (INCH/HR) = 0.14					
AREA-AVERAGED Fp (INCH/HR) = 0.30					
AREA-AVERAGED Ap = 0.47					
TOTAL AREA (ACRES) = 394.3					
PEAK FLOW RATE (CFS) = 717.40					

FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

C-41

MAINLINE Tc(MIN.) = 19.74
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.217
 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	0.20	0.30	0.200	56
COMMERCIAL	B	6.20	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.00	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.70	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.132
 SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 17.84
 EFFECTIVE AREA(ACRES) = 393.01 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 403.4 PEAK FLOW RATE(CFS) = 735.24

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

C-41

MAINLINE Tc(MIN.) = 19.74
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.217
 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	B	1.70	0.30	0.100	56
COMMERCIAL	B	0.80	0.30	0.100	56
COMMERCIAL	B	2.00	0.30	0.100	56
PUBLIC PARK	B	0.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.116
 SUBAREA AREA(ACRES) = 5.40 SUBAREA RUNOFF(CFS) = 10.61
 EFFECTIVE AREA(ACRES) = 398.41 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 408.8 PEAK FLOW RATE(CFS) = 745.84

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

C-41

MAINLINE Tc(MIN.) = 19.74
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.217
 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	0.10	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA(ACRES) = 0.10 SUBAREA RUNOFF(CFS) = 0.19

EFFECTIVE AREA(ACRES) = 398.51 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 408.9 PEAK FLOW RATE(CFS) = 746.04

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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MAINLINE Tc(MIN.) = 19.74
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.217
 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
COMMERCIAL	B	0.10	0.30	0.100	56
COMMERCIAL	B	1.10	0.30	0.100	56
SCHOOL	B	0.20	0.30	0.600	56
SCHOOL	B	0.50	0.30	0.600	56
SCHOOL	B	1.20	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.316
 SUBAREA AREA(ACRES) = 4.40 SUBAREA RUNOFF(CFS) = 8.41
 EFFECTIVE AREA(ACRES) = 402.91 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 413.3 PEAK FLOW RATE(CFS) = 754.44

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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MAINLINE Tc(MIN.) = 19.74
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.217
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	4.40	0.30	0.100	56
COMMERCIAL	B	3.50	0.30	0.100	56
COMMERCIAL	B	4.70	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.30	0.30	0.200	56
SCHOOL	B	0.60	0.30	0.600	56
SCHOOL	B	0.60	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.145
 SUBAREA AREA(ACRES) = 14.10 SUBAREA RUNOFF(CFS) = 27.59
 EFFECTIVE AREA(ACRES) = 417.01 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 427.4 PEAK FLOW RATE(CFS) = 782.03

 FLOW PROCESS FROM NODE 338.00 TO NODE 338.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.74
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.217

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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
SCHOOL	B	3.30	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 3.30 SUBAREA RUNOFF(CFS) = 6.05
 EFFECTIVE AREA(ACRES) = 420.31 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 430.7 PEAK FLOW RATE(CFS) = 788.08

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 FLOW PROCESS FROM NODE 338.00 TO NODE 339.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 332.00 DOWNSTREAM(FEET) = 301.00
 FLOW LENGTH(FEET) = 1956.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 87.0 INCH PIPE IS 67.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 23.08
 ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 788.08
 PIPE TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 21.15
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

 FLOW PROCESS FROM NODE 339.00 TO NODE 339.00 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	788.08	21.15	2.132	0.30(0.13)	0.45	420.3	327.00
2	775.23	22.18	2.076	0.30(0.13)	0.45	426.4	350.00
3	756.66	23.42	2.013	0.30(0.13)	0.45	430.7	320.00

LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 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	394.36	16.01	2.496	0.30(0.11)	0.38	178.7	300.00
2	309.69	27.31	1.845	0.30(0.12)	0.39	195.4	306.00

LONGEST FLOWPATH FROM NODE 306.00 TO NODE 339.00 = 9467.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1099.61	16.01	2.496	0.30(0.13)	0.42	496.9	300.00
2	1143.92	21.15	2.132	0.30(0.13)	0.43	606.6	327.00
3	1123.34	22.18	2.076	0.30(0.13)	0.43	614.2	350.00
4	1095.46	23.42	2.013	0.30(0.13)	0.43	620.4	320.00
5	998.92	27.31	1.845	0.30(0.13)	0.43	626.1	306.00

TOTAL AREA(ACRES) = 626.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 1143.92 Tc(MIN.) = 21.152
 EFFECTIVE AREA(ACRES) = 606.62 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 626.1
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 339.00 = 10529.00 FEET.

 FLOW PROCESS FROM NODE 339.00 TO NODE 340.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 301.00 DOWNSTREAM(FEET) = 300.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 196.00 CHANNEL SLOPE = 0.0051
 GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 2.07
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.083

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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	B	31.90	0.30	0.100	56
COMMERCIAL	B	2.30	0.30	0.100	56
COMMERCIAL	B	1.90	0.30	0.100	56
COMMERCIAL	B	1.00	0.30	0.100	56
PUBLIC PARK	B	3.10	0.30	0.850	56
PUBLIC PARK	B	0.80	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.171
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1181.41
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.66
 AVERAGE FLOW DEPTH(FEET) = 1.07 TRAVEL TIME(MIN.) = 0.89
 Tc(MIN.) = 22.05

SUBAREA AREA(ACRES) = 41.00 SUBAREA RUNOFF(CFS) = 74.97
 EFFECTIVE AREA(ACRES) = 647.62 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 667.1 PEAK FLOW RATE(CFS) = 1143.92
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
 GIVEN CHANNEL BASE(FEET) = 300.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 2.04

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.04 FLOW VELOCITY(FEET/SEC.) = 3.62
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 340.00 = 10725.00 FEET.

 FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 22.05
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.083

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	4.00	0.30	0.900	56

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RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.80 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.40 0.30 0.900 56
 PUBLIC PARK B 0.10 0.30 0.850 56
 PUBLIC PARK B 0.10 0.30 0.850 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.899
 SUBAREA AREA (ACRES) = 8.40 SUBAREA RUNOFF (CFS) = 13.71
 EFFECTIVE AREA (ACRES) = 656.02 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA (ACRES) = 675.5 PEAK FLOW RATE (CFS) = 1156.03

 FLOW PROCESS FROM NODE 340.00 TO NODE 374.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM (FEET) = 300.00 DOWNSTREAM (FEET) = 298.00
 FLOW LENGTH (FEET) = 221.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 114.0 INCH PIPE IS 83.6 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 20.75
 ESTIMATED PIPE DIAMETER (INCH) = 114.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 1156.03
 PIPE TRAVEL TIME (MIN.) = 0.18 Tc (MIN.) = 22.22
 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 374.00 = 10946.00 FEET.

 FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 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	Ae (ACRES)	HEADWATER NODE
1	1129.32	17.09	2.405	0.30 (0.12)	0.41	546.3	300.00
2	1156.03	22.22	2.074	0.30 (0.13)	0.42	656.0	327.00
3	1137.35	23.26	2.021	0.30 (0.13)	0.42	663.6	350.00
4	1111.81	24.51	1.962	0.30 (0.13)	0.42	669.8	320.00
5	1024.13	28.43	1.804	0.30 (0.13)	0.42	675.5	306.00

 LONGEST FLOWPATH FROM NODE 320.00 TO NODE 374.00 = 10946.00 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	249.46	35.65	1.587	0.30 (0.24)	0.79	195.1	390.00

 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1321.48	17.09	2.405	0.30 (0.14)	0.47	639.9	300.00
2	1367.61	22.22	2.074	0.30 (0.14)	0.47	777.6	327.00
3	1352.42	23.26	2.021	0.30 (0.14)	0.48	790.9	350.00
4	1330.96	24.51	1.962	0.30 (0.14)	0.48	803.9	320.00
5	1255.05	28.43	1.804	0.30 (0.15)	0.49	831.1	306.00

6 1141.37 35.65 1.587 0.30 (0.15) 0.50 870.6 390.00
 TOTAL AREA (ACRES) = 870.6

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE (CFS) = 1367.61 Tc (MIN.) = 22.223
 EFFECTIVE AREA (ACRES) = 777.65 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA (ACRES) = 870.6
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 374.00 = 13836.00 FEET.

 FLOW PROCESS FROM NODE 374.00 TO NODE 374.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

 FLOW PROCESS FROM NODE 374.00 TO NODE 380.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM (FEET) = 298.00 DOWNSTREAM (FEET) = 261.00
 FLOW LENGTH (FEET) = 1402.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 96.0 INCH PIPE IS 76.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 31.87
 ESTIMATED PIPE DIAMETER (INCH) = 96.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 1367.61
 PIPE TRAVEL TIME (MIN.) = 0.73 Tc (MIN.) = 22.96
 LONGEST FLOWPATH FROM NODE 390.00 TO NODE 380.00 = 15238.00 FEET.

END OF STUDY SUMMARY:
 TOTAL AREA (ACRES) = 870.6 TC (MIN.) = 22.96
 EFFECTIVE AREA (ACRES) = 777.65 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.475
 PEAK FLOW RATE (CFS) = 1367.61

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1321.48	17.83	2.349	0.30 (0.14)	0.47	639.9	300.00
2	1367.61	22.96	2.036	0.30 (0.14)	0.47	777.6	327.00
3	1352.42	23.99	1.986	0.30 (0.14)	0.48	790.9	350.00
4	1330.96	25.25	1.929	0.30 (0.14)	0.48	803.9	320.00
5	1255.05	29.18	1.777	0.30 (0.15)	0.49	831.1	306.00
6	1141.37	36.41	1.568	0.30 (0.15)	0.50	870.6	390.00

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA D ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 2-YR EV SEPTEMBER 2018 CCHI *

FILE NAME: PA3D02EV.DAT
TIME/DATE OF STUDY: 11:56 09/25/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 1.600
- 2) 10.00; 1.060
- 3) 15.00; 0.840
- 4) 20.00; 0.720
- 5) 25.00; 0.630
- 6) 30.00; 0.560
- 7) 40.00; 0.480
- 8) 50.00; 0.420
- 9) 60.00; 0.366
- 10) 90.00; 0.300
- 11) 120.00; 0.246
- 12) 180.00; 0.190
- 13) 360.00; 0.136
- 14) 1200.00; 0.080

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 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	0.020/0.020/ ---	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 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) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 605.00 DOWNSTREAM(FEET) = 586.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.417
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.339

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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"	-	1.20	0.60	0.900	56	8.77
RESIDENTIAL "3-4 DWELLINGS/ACRE"	-	1.30	0.60	0.600	56	7.42
PUBLIC PARK	-	2.40	0.60	0.850	56	8.70

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.796
SUBAREA RUNOFF(CFS) = 3.80
TOTAL AREA(ACRES) = 4.90 PEAK FLOW RATE(CFS) = 3.80

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) = 586.00 DOWNSTREAM ELEVATION(FEET) = 583.00
STREET LENGTH(FEET) = 333.00 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) = 6.15
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.37
HALFSTREET FLOOD WIDTH(FEET) = 11.52
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.23
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.82
STREET FLOW TRAVEL TIME(MIN.) = 2.49 Tc(MIN.) = 9.91

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.070

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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
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	0.40	0.60	0.850	-
USER-DEFINED	-	1.90	0.60	0.400	-
USER-DEFINED	-	4.70	0.60	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.565

SUBAREA AREA (ACRES) = 7.10 SUBAREA RUNOFF (CFS) = 4.67

EFFECTIVE AREA (ACRES) = 12.00 AREA-AVERAGED Fm (INCH/HR) = 0.40

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.66

TOTAL AREA (ACRES) = 12.0 PEAK FLOW RATE (CFS) = 7.29

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.39 HALFSTREET FLOOD WIDTH (FEET) = 12.46

FLOW VELOCITY (FEET/SEC.) = 2.30 DEPTH*VELOCITY (FT*FT/SEC.) = 0.89

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.00 = 663.00 FEET.

FLOW PROCESS FROM NODE 402.00 TO NODE 402.50 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 583.00 DOWNSTREAM ELEVATION (FEET) = 580.00

STREET LENGTH (FEET) = 315.00 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) = 8.67

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.40

HALFSTREET FLOOD WIDTH (FEET) = 13.24

AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.46

PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 0.98

STREET FLOW TRAVEL TIME (MIN.) = 2.13 Tc (MIN.) = 12.04

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.970

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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
USER-DEFINED	-	0.50	0.60	0.850	-
USER-DEFINED	-	1.80	0.60	0.600	-
USER-DEFINED	-	0.10	0.60	0.500	-
USER-DEFINED	-	2.30	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527

SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 2.77

EFFECTIVE AREA (ACRES) = 16.70 AREA-AVERAGED Fm (INCH/HR) = 0.37

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.62

TOTAL AREA (ACRES) = 16.7 PEAK FLOW RATE (CFS) = 8.98

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.40 HALFSTREET FLOOD WIDTH (FEET) = 13.48

FLOW VELOCITY (FEET/SEC.) = 2.47 DEPTH*VELOCITY (FT*FT/SEC.) = 1.00

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.50 = 978.00 FEET.

FLOW PROCESS FROM NODE 402.50 TO NODE 403.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 580.00 DOWNSTREAM ELEVATION (FEET) = 579.00

STREET LENGTH (FEET) = 394.00 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) = 9.74

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.49

HALFSTREET FLOOD WIDTH (FEET) = 18.32

AVERAGE FLOW VELOCITY (FEET/SEC.) = 1.53

PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 0.75

STREET FLOW TRAVEL TIME (MIN.) = 4.30 Tc (MIN.) = 16.34

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.808

D-3.1

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.60	0.850	-
USER-DEFINED	-	0.10	0.60	0.600	-
USER-DEFINED	-	2.80	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.435

SUBAREA AREA (ACRES) = 3.10 SUBAREA RUNOFF (CFS) = 1.52

EFFECTIVE AREA (ACRES) = 19.80 AREA-AVERAGED Fm (INCH/HR) = 0.36

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.59

TOTAL AREA (ACRES) = 19.8 PEAK FLOW RATE (CFS) = 8.98

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.48 HALFSTREET FLOOD WIDTH (FEET) = 17.70

FLOW VELOCITY (FEET/SEC.) = 1.50 DEPTH*VELOCITY (FT*FT/SEC.) = 0.72

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 1372.00 FEET.

FLOW PROCESS FROM NODE 403.00 TO NODE 404.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 579.00 DOWNSTREAM ELEVATION(FEET) = 560.00
STREET LENGTH(FEET) = 974.00 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) = 11.09

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.62
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.43
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.33
STREET FLOW TRAVEL TIME(MIN.) = 4.73 Tc(MIN.) = 21.07

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.701 **D-4**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	5.80	0.60	0.100	-
USER-DEFINED	-	0.70	0.60	0.100	-
USER-DEFINED	-	1.10	0.60	0.850	-
USER-DEFINED	-	0.70	0.60	0.850	-
USER-DEFINED	-	0.10	0.60	0.200	-
USER-DEFINED	-	0.30	0.60	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.267
SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 4.23
EFFECTIVE AREA(ACRES) = 28.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 28.5 PEAK FLOW RATE(CFS) = 10.39

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.38 HALFSTREET FLOOD WIDTH(FEET) = 12.23
FLOW VELOCITY(FEET/SEC.) = 3.40 DEPTH*VELOCITY(FT*FT/SEC.) = 1.29
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 404.00 = 2346.00 FEET.

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 21.07
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.701 **D-5**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.10	0.60	0.600	-
USER-DEFINED	-	2.30	0.60	0.900	-
USER-DEFINED	-	2.70	0.60	0.500	-

USER-DEFINED - 3.40 0.60 0.400 -
USER-DEFINED - 5.30 0.60 0.200 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.432
SUBAREA AREA(ACRES) = 13.90 SUBAREA RUNOFF(CFS) = 5.53
EFFECTIVE AREA(ACRES) = 42.40 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 42.4 PEAK FLOW RATE(CFS) = 15.91

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 21.07
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.701 **D-5**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.60	0.900	-
USER-DEFINED	-	0.20	0.60	0.900	-
USER-DEFINED	-	0.20	0.60	0.900	-
USER-DEFINED	-	0.20	0.60	0.900	-
USER-DEFINED	-	0.20	0.60	0.900	-
USER-DEFINED	-	0.20	0.60	0.900	-

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 21.07
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.701 **D-6**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.200	-
USER-DEFINED	-	0.10	0.60	0.200	-
USER-DEFINED	-	0.20	0.60	0.400	-
USER-DEFINED	-	1.50	0.60	0.850	-
USER-DEFINED	-	2.50	0.60	0.500	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.590
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 1.40
EFFECTIVE AREA(ACRES) = 47.10 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 47.1 PEAK FLOW RATE(CFS) = 17.35

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 21.07
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.701

SUBAREA LOSS RATE DATA(AMC II):

D-6

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.80	0.60	0.850	-
USER-DEFINED	-	3.00	0.60	0.900	-
USER-DEFINED	-	6.40	0.60	0.500	-
USER-DEFINED	-	6.70	0.60	0.600	-
USER-DEFINED	-	4.30	0.60	0.900	-
USER-DEFINED	-	8.70	0.60	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.671
SUBAREA AREA (ACRES) = 31.90 SUBAREA RUNOFF (CFS) = 8.57
EFFECTIVE AREA (ACRES) = 79.00 AREA-AVERAGED Fm (INCH/HR) = 0.34
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.56
TOTAL AREA (ACRES) = 79.0 PEAK FLOW RATE (CFS) = 25.92

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 21.07
RAINFALL INTENSITY (INCH/HR) = 0.70
AREA-AVERAGED Fm (INCH/HR) = 0.34
AREA-AVERAGED Fp (INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.56
EFFECTIVE STREAM AREA (ACRES) = 79.00
TOTAL STREAM AREA (ACRES) = 79.00
PEAK FLOW RATE (CFS) AT CONFLUENCE = 25.92

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) = 729.00 DOWNSTREAM (FEET) = 630.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)] ** 0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.120
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.155

OD-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, NARROW LEAF"	-	0.10	0.60	1.000	56	9.12
NATURAL FAIR COVER "OPEN BRUSH"	-	1.30	0.60	1.000	56	9.12
NATURAL FAIR COVER "OPEN BRUSH"	-	0.10	0.60	1.000	56	9.12

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 0.75
TOTAL AREA (ACRES) = 1.50 PEAK FLOW RATE (CFS) = 0.75

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
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.071

OD-2

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.70	0.60	1.000	-
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.10	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 1.15
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.21
AVERAGE FLOW DEPTH (FEET) = 0.30 TRAVEL TIME (MIN.) = 0.78
Tc (MIN.) = 9.90
SUBAREA AREA (ACRES) = 1.90 SUBAREA RUNOFF (CFS) = 0.81
EFFECTIVE AREA (ACRES) = 3.40 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 3.4 PEAK FLOW RATE (CFS) = 1.44

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.33 FLOW VELOCITY (FEET/SEC.) = 4.39
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) = 570.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 243.00 CHANNEL SLOPE = 0.1111
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 20.00
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.023

OD-3

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	3.80	0.60	1.000	-
USER-DEFINED	-	0.30	0.60	1.000	-
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.20	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 2.30
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.26
AVERAGE FLOW DEPTH (FEET) = 0.42 TRAVEL TIME (MIN.) = 0.95
Tc (MIN.) = 10.85
SUBAREA AREA (ACRES) = 4.50 SUBAREA RUNOFF (CFS) = 1.72
EFFECTIVE AREA (ACRES) = 7.90 AREA-AVERAGED Fm (INCH/HR) = 0.60

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 7.9 PEAK FLOW RATE (CFS) = 3.01

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.47 FLOW VELOCITY (FEET/SEC.) = 4.54
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.00 = 768.00 FEET.

FLOW PROCESS FROM NODE 433.00 TO NODE 433.10 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) = 564.00
FLOW LENGTH (FEET) = 1076.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 3.99
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 3.01
PIPE TRAVEL TIME (MIN.) = 4.50 Tc (MIN.) = 15.34
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.10 = 1844.00 FEET.

FLOW PROCESS FROM NODE 433.10 TO NODE 433.10 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 15.34
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.832
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.50 0.60 0.850 -
USER-DEFINED - 1.70 0.60 0.900 -
USER-DEFINED - 5.40 0.60 0.500 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.613
SUBAREA AREA (ACRES) = 7.60 SUBAREA RUNOFF (CFS) = 3.18
EFFECTIVE AREA (ACRES) = 15.50 AREA-AVERAGED Fm (INCH/HR) = 0.49
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.81
TOTAL AREA (ACRES) = 15.5 PEAK FLOW RATE (CFS) = 4.83

D-8

FLOW PROCESS FROM NODE 433.10 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) = 564.00 DOWNSTREAM (FEET) = 560.00
FLOW LENGTH (FEET) = 830.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.1 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 4.23
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 4.83
PIPE TRAVEL TIME (MIN.) = 3.27 Tc (MIN.) = 18.61
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 18.61
RAINFALL INTENSITY (INCH/HR) = 0.75
AREA-AVERAGED Fm (INCH/HR) = 0.49
AREA-AVERAGED Fp (INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.81
EFFECTIVE STREAM AREA (ACRES) = 15.50
TOTAL STREAM AREA (ACRES) = 15.50
PEAK FLOW RATE (CFS) AT CONFLUENCE = 4.83

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	25.92	21.07	0.701	0.60 (0.34)	0.56	79.0	400.00
2	4.83	18.61	0.753	0.60 (0.49)	0.81	15.5	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	30.75	18.61	0.753	0.60 (0.36)	0.61	85.3	430.00
2	29.80	21.07	0.701	0.60 (0.36)	0.60	94.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 30.75 Tc (MIN.) = 18.61
EFFECTIVE AREA (ACRES) = 85.29 AREA-AVERAGED Fm (INCH/HR) = 0.36
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.61
TOTAL AREA (ACRES) = 94.5
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

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) = 560.00 DOWNSTREAM (FEET) = 557.00
FLOW LENGTH (FEET) = 377.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 7.99
ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 30.75
PIPE TRAVEL TIME (MIN.) = 0.79 Tc (MIN.) = 19.40
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 405.00 = 3051.00 FEET.

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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=====
MAINLINE Tc(MIN.) = 19.40
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.734
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         1.30   0.60   0.100  -
USER-DEFINED        -         0.90   0.60   0.850  -
USER-DEFINED        -         0.20   0.60   0.200  -
USER-DEFINED        -         4.50   0.60   0.500  -
USER-DEFINED        -         3.20   0.60   0.400  -
USER-DEFINED        -         1.20   0.60   0.100  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.406
SUBAREA AREA(ACRES) = 11.30   SUBAREA RUNOFF(CFS) = 4.99
EFFECTIVE AREA(ACRES) = 96.59   AREA-AVERAGED Fm(INCH/HR) = 0.35
AREA-AVERAGED Fp(INCH/HR) = 0.60   AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 105.8   PEAK FLOW RATE(CFS) = 33.48

```

D-9

```

*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

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=====
MAINLINE Tc(MIN.) = 19.40
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.734
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         0.20   0.60   0.850  -
USER-DEFINED        -         0.10   0.60   0.200  -
USER-DEFINED        -         4.20   0.60   0.500  -
USER-DEFINED        -         3.80   0.60   0.400  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.459
SUBAREA AREA(ACRES) = 8.30   SUBAREA RUNOFF(CFS) = 3.43
EFFECTIVE AREA(ACRES) = 104.89   AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.60   AREA-AVERAGED Ap = 0.57
TOTAL AREA(ACRES) = 114.1   PEAK FLOW RATE(CFS) = 36.90

```

D-9

```

*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

=====
MAINLINE Tc(MIN.) = 19.40
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.734
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         4.80   0.60   0.200  -
USER-DEFINED        -         0.10   0.60   0.600  -
USER-DEFINED        -         5.20   0.60   0.400  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.307
SUBAREA AREA(ACRES) = 10.10   SUBAREA RUNOFF(CFS) = 5.00
EFFECTIVE AREA(ACRES) = 114.99   AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.60   AREA-AVERAGED Ap = 0.55

```

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```

TOTAL AREA(ACRES) = 124.2   PEAK FLOW RATE(CFS) = 41.91

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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)<<<<
-----

```

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ELEVATION DATA: UPSTREAM(FEET) = 557.00 DOWNSTREAM(FEET) = 535.00
FLOW LENGTH(FEET) = 525.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.92
ESTIMATED PIPE DIAMETER(INCH) = 24.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.91
PIPE TRAVEL TIME(MIN.) = 0.55   Tc(MIN.) = 19.95
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 406.00 = 3576.00 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<<<<
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=====
MAINLINE Tc(MIN.) = 19.95
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.721
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         0.30   0.60   0.900  -
USER-DEFINED        -         0.90   0.60   0.850  -
USER-DEFINED        -         8.70   0.60   0.200  -
USER-DEFINED        -         0.10   0.60   0.900  -
USER-DEFINED        -         0.10   0.60   0.600  -
USER-DEFINED        -         0.40   0.60   0.850  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.311
SUBAREA AREA(ACRES) = 10.50   SUBAREA RUNOFF(CFS) = 5.05
EFFECTIVE AREA(ACRES) = 125.49   AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60   AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 134.7   PEAK FLOW RATE(CFS) = 45.59

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D-10

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*****
FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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=====
MAINLINE Tc(MIN.) = 19.95
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.721
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED        -         9.00   0.60   0.200  -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 9.00   SUBAREA RUNOFF(CFS) = 4.87
EFFECTIVE AREA(ACRES) = 134.49   AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.60   AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 143.7   PEAK FLOW RATE(CFS) = 50.46

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D-10

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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.) = 19.95
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.721
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.30 0.60 0.600 -
USER-DEFINED - 0.50 0.60 0.900 -
USER-DEFINED - 18.70 0.60 0.600 -
USER-DEFINED - 1.00 0.60 0.600 -
USER-DEFINED - 0.10 0.60 0.900 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.609
SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 6.60
EFFECTIVE AREA(ACRES) = 155.09 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 164.3 PEAK FLOW RATE(CFS) = 57.06

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D-11

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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) = 535.00 DOWNSTREAM(FEET) = 510.00
FLOW LENGTH(FEET) = 311.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.02
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 57.06
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 20.19
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 407.00 = 3887.00 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.) = 20.19
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.717
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.10 0.60 0.500 -
USER-DEFINED - 1.10 0.60 0.900 -
USER-DEFINED - 2.20 0.60 0.100 -
USER-DEFINED - 0.40 0.60 0.900 -
USER-DEFINED - 1.10 0.60 0.100 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.353
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 2.23
EFFECTIVE AREA(ACRES) = 159.99 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 169.2 PEAK FLOW RATE(CFS) = 58.66

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D-11.1

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*****
FLOW PROCESS FROM NODE 407.00 TO NODE 408.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 510.00 DOWNSTREAM(FEET) = 480.00
FLOW LENGTH(FEET) = 624.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.36
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 58.66
PIPE TRAVEL TIME(MIN.) = 0.57 Tc(MIN.) = 20.75
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 408.00 = 4511.00 FEET.

```

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*****
FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.75
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.706
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.70 0.60 0.900 -
USER-DEFINED - 1.60 0.60 0.600 -
USER-DEFINED - 1.40 0.60 0.100 -
USER-DEFINED - 4.80 0.60 0.900 -
USER-DEFINED - 4.20 0.60 0.600 -
USER-DEFINED - 2.20 0.60 0.500 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.649
SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 4.25
EFFECTIVE AREA(ACRES) = 174.89 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 184.1 PEAK FLOW RATE(CFS) = 61.44

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D-12

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*****
FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 20.75
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.706
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.30 0.60 0.100 -
USER-DEFINED - 2.10 0.60 0.900 -
USER-DEFINED - 6.60 0.60 0.600 -
USER-DEFINED - 2.00 0.60 0.500 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.625
SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 3.28
EFFECTIVE AREA(ACRES) = 185.89 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.53

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D-12

TOTAL AREA (ACRES) = 195.1 PEAK FLOW RATE (CFS) = 64.72

FLOW PROCESS FROM NODE 408.00 TO NODE 409.00 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) = 460.00
FLOW LENGTH(FEET) = 368.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.59
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 64.72
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 21.06
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 409.00 = 4879.00 FEET.

FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.06
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.701

D-13

SUBAREA LOSS RATE DATA(AMC II):

Table with 6 columns: DEVELOPMENT TYPE/, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include USER-DEFINED and various land use types.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.658
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 1.60
EFFECTIVE AREA(ACRES) = 191.69 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 200.9 PEAK FLOW RATE(CFS) = 65.38

FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.06
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.701

D-13

SUBAREA LOSS RATE DATA(AMC II):

Table with 6 columns: DEVELOPMENT TYPE/, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include USER-DEFINED and various land use types.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.616

SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 2.71
EFFECTIVE AREA(ACRES) = 200.79 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 210.0 PEAK FLOW RATE(CFS) = 68.90

FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.06
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.701

D-13

SUBAREA LOSS RATE DATA(AMC II):

Table with 6 columns: DEVELOPMENT TYPE/, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include USER-DEFINED and various land use types.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 1.89
EFFECTIVE AREA(ACRES) = 206.59 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 215.8 PEAK FLOW RATE(CFS) = 69.98

FLOW PROCESS FROM NODE 409.00 TO NODE 410.00 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) = 445.00
FLOW LENGTH(FEET) = 291.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.96
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 69.98
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 21.31
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 410.00 = 5170.00 FEET.

FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.31
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.696

D-14

SUBAREA LOSS RATE DATA(AMC II):

Table with 6 columns: DEVELOPMENT TYPE/, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include USER-DEFINED and various land use types.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 3.81

EFFECTIVE AREA(ACRES) = 216.59 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 225.8 PEAK FLOW RATE(CFS) = 72.97

FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.31 **D-14**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.696
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.10 0.60 0.850 -
USER-DEFINED - 0.10 0.60 0.200 -
USER-DEFINED - 4.00 0.60 0.600 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.645
SUBAREA AREA(ACRES) = 5.20 SUBAREA RUNOFF(CFS) = 1.45
EFFECTIVE AREA(ACRES) = 221.79 AREA-AVERAGED Fm(INCH/HR) = 0.32
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 231.0 PEAK FLOW RATE(CFS) = 74.42

FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.31 **D-14.1**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.696
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.10 0.60 0.200 -
USER-DEFINED - 8.90 0.60 0.200 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 5.71
EFFECTIVE AREA(ACRES) = 232.79 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 242.0 PEAK FLOW RATE(CFS) = 80.13

FLOW PROCESS FROM NODE 410.00 TO NODE 411.00 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) = 425.00
FLOW LENGTH(FEET) = 324.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.02
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 80.13
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 21.55
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 411.00 = 5494.00 FEET.

FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.55 **D-15**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.692
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.10 0.60 0.200 -
USER-DEFINED - 0.20 0.60 0.100 -
USER-DEFINED - 1.70 0.60 0.850 -
USER-DEFINED - 0.70 0.60 0.200 -
USER-DEFINED - 0.20 0.60 0.600 -
USER-DEFINED - 0.70 0.60 0.100 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.504
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 1.26
EFFECTIVE AREA(ACRES) = 236.39 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 245.6 PEAK FLOW RATE(CFS) = 80.46

FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.55 **D-15**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.692
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.90 0.60 0.850 -
USER-DEFINED - 8.80 0.60 0.200 -
USER-DEFINED - 0.20 0.60 0.600 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.267
SUBAREA AREA(ACRES) = 9.90 SUBAREA RUNOFF(CFS) = 4.74
EFFECTIVE AREA(ACRES) = 246.29 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 255.5 PEAK FLOW RATE(CFS) = 85.20

FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 21.55 **D-15.1**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.692
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.50 0.60 0.200 -
USER-DEFINED - 0.10 0.60 0.900 -
USER-DEFINED - 2.10 0.60 0.600 -
USER-DEFINED - 0.70 0.60 0.200 -
USER-DEFINED - 0.10 0.60 0.900 -

USER-DEFINED - 4.30 0.60 0.600 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.546
 SUBAREA AREA (ACRES) = 7.80 SUBAREA RUNOFF (CFS) = 2.56
 EFFECTIVE AREA (ACRES) = 254.09 AREA-AVERAGED Fm (INCH/HR) = 0.31
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.51
 TOTAL AREA (ACRES) = 263.3 PEAK FLOW RATE (CFS) = 87.76

 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) = 425.00 DOWNSTREAM (FEET) = 392.00
 FLOW LENGTH (FEET) = 641.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 20.51
 ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 87.76
 PIPE TRAVEL TIME (MIN.) = 0.52 Tc (MIN.) = 22.07
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 412.00 = 6135.00 FEET.

 FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 22.07
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.683

D-16

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.60	0.100	-
USER-DEFINED	-	5.30	0.60	0.200	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	1.10	0.60	0.100	-
USER-DEFINED	-	7.30	0.60	0.200	-
USER-DEFINED	-	0.10	0.60	0.900	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.198
 SUBAREA AREA (ACRES) = 14.50 SUBAREA RUNOFF (CFS) = 7.36
 EFFECTIVE AREA (ACRES) = 268.59 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.50
 TOTAL AREA (ACRES) = 277.8 PEAK FLOW RATE (CFS) = 92.97

 FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 22.07
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.683

D-32

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.60	0.200	-
USER-DEFINED	-	0.20	0.60	0.100	-

USER-DEFINED - 4.10 0.60 0.200 -
 USER-DEFINED - 0.60 0.60 0.900 -
 USER-DEFINED - 3.10 0.60 0.400 -
 USER-DEFINED - 0.50 0.60 0.200 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.317
 SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 3.86
 EFFECTIVE AREA (ACRES) = 277.29 AREA-AVERAGED Fm (INCH/HR) = 0.29
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 286.5 PEAK FLOW RATE (CFS) = 96.83

 FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 22.07
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.683

D-32

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.60	0.900	-
USER-DEFINED	-	4.00	0.60	0.400	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456
 SUBAREA AREA (ACRES) = 4.50 SUBAREA RUNOFF (CFS) = 1.66
 EFFECTIVE AREA (ACRES) = 281.79 AREA-AVERAGED Fm (INCH/HR) = 0.29
 AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 291.0 PEAK FLOW RATE (CFS) = 98.49

 FLOW PROCESS FROM NODE 412.00 TO NODE 420.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM (FEET) = 392.00 DOWNSTREAM (FEET) = 350.00
 FLOW LENGTH (FEET) = 1358.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.3 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 17.78
 ESTIMATED PIPE DIAMETER (INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 98.49
 PIPE TRAVEL TIME (MIN.) = 1.27 Tc (MIN.) = 23.35
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 420.00 = 7493.00 FEET.

 FLOW PROCESS FROM NODE 420.00 TO NODE 420.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 23.35
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.660

D-35

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.60	0.100	-
USER-DEFINED	-	1.30	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.105
SUBAREA AREA(ACRES) = 1.90 SUBAREA RUNOFF(CFS) = 1.02
EFFECTIVE AREA(ACRES) = 283.69 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 292.9 PEAK FLOW RATE(CFS) = 98.49
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 420.00 TO NODE 421.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 346.00 DOWNSTREAM(FEET) = 320.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1617.00 CHANNEL SLOPE = 0.0161
CHANNEL BASE(FEET) = 200.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 20.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.520
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	6.90	0.60	0.100	-
USER-DEFINED	-	3.60	0.60	0.100	-
USER-DEFINED	-	2.20	0.60	0.100	-
USER-DEFINED	-	0.70	0.60	0.900	-
USER-DEFINED	-	0.40	0.60	0.900	-
USER-DEFINED	-	1.30	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.227
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 101.22
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.31
AVERAGE FLOW DEPTH(FEET) = 0.22 TRAVEL TIME(MIN.) = 11.67
Tc(MIN.) = 35.02
SUBAREA AREA(ACRES) = 15.10 SUBAREA RUNOFF(CFS) = 5.46
EFFECTIVE AREA(ACRES) = 298.79 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.47
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TOTAL AREA(ACRES) = 308.0 PEAK FLOW RATE(CFS) = 98.49
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.22 FLOW VELOCITY(FEET/SEC.) = 2.27
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 421.00 = 9110.00 FEET.

FLOW PROCESS FROM NODE 421.00 TO NODE 421.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 35.02
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.520
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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USER-DEFINED - 1.10 0.60 0.850 - D-34
USER-DEFINED - 2.50 0.60 0.850 -
USER-DEFINED - 3.60 0.60 0.850 -

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 0.51
EFFECTIVE AREA(ACRES) = 305.99 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TOTAL AREA(ACRES) = 315.2 PEAK FLOW RATE(CFS) = 98.49
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 421.00 TO NODE 427.00 IS CODE = 31

>>>>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) = 1453.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.14
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 98.49
PIPE TRAVEL TIME(MIN.) = 2.39 Tc(MIN.) = 37.40
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 37.40
RAINFALL INTENSITY(INCH/HR) = 0.50
AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.48
EFFECTIVE STREAM AREA(ACRES) = 305.99
TOTAL STREAM AREA(ACRES) = 315.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 98.49

FLOW PROCESS FROM NODE 413.00 TO NODE 414.00 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) = 515.00 DOWNSTREAM(FEET) = 497.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.533
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.542

D-21

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	-	0.10	0.60	0.100	56	5.53
PUBLIC PARK	-	1.10	0.60	0.850	56	8.79
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	-	0.10	0.60	0.600	56	7.50
COMMERCIAL	-	0.10	0.60	0.100	56	5.53
PUBLIC PARK	-	0.30	0.60	0.850	56	8.79
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	-	1.50	0.60	0.600	56	7.50

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.678
SUBAREA RUNOFF (CFS) = 3.27
TOTAL AREA (ACRES) = 3.20 PEAK FLOW RATE (CFS) = 3.27

FLOW PROCESS FROM NODE 414.00 TO NODE 414.10 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 497.00 DOWNSTREAM ELEVATION (FEET) = 493.00
STREET LENGTH (FEET) = 371.00 CURB HEIGHT (INCHES) = 8.0
STREET HALFWIDTH (FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 20.00
INSIDE STREET CROSSFALL (DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL (DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL (DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 5.12
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.34
HALFSTREET FLOOD WIDTH (FEET) = 10.12
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.31
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 0.79
STREET FLOW TRAVEL TIME (MIN.) = 2.68 Tc (MIN.) = 8.21
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.254

D-22

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.40	0.60	0.850	-
USER-DEFINED	-	1.40	0.60	0.600	-
USER-DEFINED	-	2.00	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.673
SUBAREA AREA (ACRES) = 4.80 SUBAREA RUNOFF (CFS) = 3.67
EFFECTIVE AREA (ACRES) = 8.00 AREA-AVERAGED Fm (INCH/HR) = 0.40
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.68
TOTAL AREA (ACRES) = 8.0 PEAK FLOW RATE (CFS) = 6.11

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.36 HALFSTREET FLOOD WIDTH (FEET) = 11.05

FLOW VELOCITY (FEET/SEC.) = 2.38 DEPTH*VELOCITY (FT*FT/SEC.) = 0.86
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.10 = 701.00 FEET.

FLOW PROCESS FROM NODE 414.10 TO NODE 414.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 493.00 DOWNSTREAM ELEVATION (FEET) = 490.00
STREET LENGTH (FEET) = 476.00 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) = 7.78
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.41
HALFSTREET FLOOD WIDTH (FEET) = 13.79
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.06
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 0.84
STREET FLOW TRAVEL TIME (MIN.) = 3.86 Tc (MIN.) = 12.07
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.969

D-23

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.200	-
USER-DEFINED	-	0.50	0.60	0.100	-
USER-DEFINED	-	3.40	0.60	0.600	-
USER-DEFINED	-	0.40	0.60	0.100	-
USER-DEFINED	-	1.20	0.60	0.600	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.513
SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 3.33
EFFECTIVE AREA (ACRES) = 13.60 AREA-AVERAGED Fm (INCH/HR) = 0.36
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.61
TOTAL AREA (ACRES) = 13.6 PEAK FLOW RATE (CFS) = 7.40

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.40 HALFSTREET FLOOD WIDTH (FEET) = 13.55
FLOW VELOCITY (FEET/SEC.) = 2.02 DEPTH*VELOCITY (FT*FT/SEC.) = 0.82
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.20 = 1177.00 FEET.

FLOW PROCESS FROM NODE 414.20 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) = 490.00 DOWNSTREAM (FEET) = 465.00
FLOW LENGTH (FEET) = 488.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.1 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 11.44
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.40
 PIPE TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 12.78
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 415.00 = 1665.00 FEET.

 FLOW PROCESS FROM NODE 415.00 TO NODE 415.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 12.78
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.938 **D-24**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	2.30	0.60	0.600	-
USER-DEFINED	-	0.10	0.60	0.200	-
USER-DEFINED	-	0.80	0.60	0.100	-
USER-DEFINED	-	3.20	0.60	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.537
 SUBAREA AREA(ACRES) = 6.50 SUBAREA RUNOFF(CFS) = 3.60
 EFFECTIVE AREA(ACRES) = 20.10 AREA-AVERAGED Fm(INCH/HR) = 0.35
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.59
 TOTAL AREA(ACRES) = 20.1 PEAK FLOW RATE(CFS) = 10.62

 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) = 465.00 DOWNSTREAM(FEET) = 440.00
 FLOW LENGTH(FEET) = 497.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.7 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 12.48
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 10.62
 PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 13.44
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 416.00 = 2162.00 FEET.

 FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.44
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.909 **D-26**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.80	0.60	0.100	-
USER-DEFINED	-	0.40	0.60	0.900	-

USER-DEFINED - 3.70 0.60 0.400 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.392
 SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 2.97
 EFFECTIVE AREA(ACRES) = 25.00 AREA-AVERAGED Fm(INCH/HR) = 0.33
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.55
 TOTAL AREA(ACRES) = 25.0 PEAK FLOW RATE(CFS) = 13.06

 FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.44
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.909 **D-25**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.80	0.60	0.200	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	1.60	0.60	0.600	-
USER-DEFINED	-	3.60	0.60	0.200	-
USER-DEFINED	-	3.00	0.60	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.389
 SUBAREA AREA(ACRES) = 10.10 SUBAREA RUNOFF(CFS) = 6.14
 EFFECTIVE AREA(ACRES) = 35.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 35.1 PEAK FLOW RATE(CFS) = 19.20

 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) = 440.00 DOWNSTREAM(FEET) = 420.00
 FLOW LENGTH(FEET) = 437.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 13.65
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 19.20
 PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 13.97
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 417.00 = 2599.00 FEET.

 FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.97
 * 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.885 **D-27**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.50	0.60	0.200	-
USER-DEFINED	-	0.70	0.60	0.100	-
USER-DEFINED	-	3.40	0.60	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.187
 SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 3.89
 EFFECTIVE AREA(ACRES) = 40.70 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 40.7 PEAK FLOW RATE(CFS) = 22.35

 FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.97

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.885

D-28

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.60	0.60	0.100	-
USER-DEFINED	-	4.00	0.60	0.200	-
USER-DEFINED	-	0.20	0.60	0.900	-
USER-DEFINED	-	1.50	0.60	0.100	-
USER-DEFINED	-	2.10	0.60	0.850	-
USER-DEFINED	-	1.60	0.60	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.264

SUBAREA AREA(ACRES) = 14.00 SUBAREA RUNOFF(CFS) = 9.16

EFFECTIVE AREA(ACRES) = 54.70 AREA-AVERAGED Fm(INCH/HR) = 0.25

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.41

TOTAL AREA(ACRES) = 54.7 PEAK FLOW RATE(CFS) = 31.51

 FLOW PROCESS FROM NODE 417.00 TO NODE 418.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 420.00 DOWNSTREAM(FEET) = 400.00

FLOW LENGTH(FEET) = 619.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 13.69

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 31.51

PIPE TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 14.73

LONGEST FLOWPATH FROM NODE 413.00 TO NODE 418.00 = 3218.00 FEET.

 FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 14.73

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.852

D-30

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.70	0.60	0.100	-
USER-DEFINED	-	2.10	0.60	0.100	-
USER-DEFINED	-	3.90	0.60	0.100	-

USER-DEFINED - 0.20 0.60 0.900 -
 USER-DEFINED - 5.50 0.60 0.500 -
 USER-DEFINED - 3.20 0.60 0.500 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.333
 SUBAREA AREA(ACRES) = 15.60 SUBAREA RUNOFF(CFS) = 9.15
 EFFECTIVE AREA(ACRES) = 70.30 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 70.3 PEAK FLOW RATE(CFS) = 39.03

 FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 14.73

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.852

D-30

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.30	0.60	0.500	-
USER-DEFINED	-	0.40	0.60	0.400	-
USER-DEFINED	-	3.10	0.60	0.400	-
USER-DEFINED	-	0.20	0.60	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407

SUBAREA AREA(ACRES) = 4.00 SUBAREA RUNOFF(CFS) = 2.19

EFFECTIVE AREA(ACRES) = 74.30 AREA-AVERAGED Fm(INCH/HR) = 0.24

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.39

TOTAL AREA(ACRES) = 74.3 PEAK FLOW RATE(CFS) = 41.22

 FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 14.73

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.852

D-29

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.60	0.100	-
USER-DEFINED	-	2.20	0.60	0.200	-
USER-DEFINED	-	3.70	0.60	0.100	-
USER-DEFINED	-	3.50	0.60	0.200	-
USER-DEFINED	-	0.70	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.154

SUBAREA AREA(ACRES) = 10.80 SUBAREA RUNOFF(CFS) = 7.39

EFFECTIVE AREA(ACRES) = 85.10 AREA-AVERAGED Fm(INCH/HR) = 0.22

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.36

TOTAL AREA(ACRES) = 85.1 PEAK FLOW RATE(CFS) = 48.60

 FLOW PROCESS FROM NODE 418.00 TO NODE 425.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 320.00
FLOW LENGTH(FEET) = 1179.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.04
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 48.60
PIPE TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 15.71
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 425.00 = 4397.00 FEET.

FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 15.71
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.823

D-33

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.60 0.60 0.100 -
USER-DEFINED - 0.40 0.60 0.100 -
USER-DEFINED - 0.90 0.60 0.100 -
USER-DEFINED - 5.30 0.60 0.850 -
USER-DEFINED - 3.10 0.60 0.850 -
USER-DEFINED - 9.10 0.60 0.850 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.777
SUBAREA AREA(ACRES) = 19.40 SUBAREA RUNOFF(CFS) = 6.24
EFFECTIVE AREA(ACRES) = 104.50 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 104.5 PEAK FLOW RATE(CFS) = 52.62

FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 15.71
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.823

D-33

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.30 0.60 0.900 -
USER-DEFINED - 1.90 0.60 0.900 -
USER-DEFINED - 1.90 0.60 0.900 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 1.30
EFFECTIVE AREA(ACRES) = 109.60 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
TOTAL AREA(ACRES) = 109.6 PEAK FLOW RATE(CFS) = 53.92

FLOW PROCESS FROM NODE 425.00 TO NODE 426.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM(FEET) = 320.00 DOWNSTREAM(FEET) = 316.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 870.00 CHANNEL SLOPE = 0.0046
GIVEN CHANNEL BASE(FEET) = 200.00 CHANNEL FREEBOARD(FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030

* ESTIMATED CHANNEL HEIGHT(FEET) = 1.23
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.596

D-36

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 3.40 0.60 0.100 -
USER-DEFINED - 3.30 0.60 0.100 -
USER-DEFINED - 0.80 0.60 0.850 -
USER-DEFINED - 0.30 0.60 0.850 -
USER-DEFINED - 0.90 0.60 0.900 -
USER-DEFINED - 2.30 0.60 0.900 -

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.408
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 55.67
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.24
AVERAGE FLOW DEPTH(FEET) = 0.22 TRAVEL TIME(MIN.) = 11.71
Tc(MIN.) = 27.42

SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 3.50
EFFECTIVE AREA(ACRES) = 120.60 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TOTAL AREA(ACRES) = 120.6 PEAK FLOW RATE(CFS) = 53.92
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
GIVEN CHANNEL BASE(FEET) = 200.00 CHANNEL FREEBOARD(FEET) = 1.0
"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
* ESTIMATED CHANNEL HEIGHT(FEET) = 1.22

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.22 FLOW VELOCITY(FEET/SEC.) = 1.23
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 426.00 = 5267.00 FEET.

FLOW PROCESS FROM NODE 426.00 TO NODE 426.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 27.42
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.596

D-37

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.50 0.60 0.100 -
USER-DEFINED - 1.70 0.60 0.900 -
USER-DEFINED - 0.50 0.60 0.850 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.569
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
SUBAREA AREA(ACRES) = 3.70 SUBAREA RUNOFF(CFS) = 0.86

EFFECTIVE AREA(ACRES) = 124.30 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.46
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) = 124.3 PEAK FLOW RATE(CFS) = 53.92
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 426.00 TO NODE 427.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 316.00 DOWNSTREAM(FEET) = 310.00
 FLOW LENGTH(FEET) = 321.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.79
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 53.92
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 27.84
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 427.00 = 5588.00 FEET.

 FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 27.84
 RAINFALL INTENSITY(INCH/HR) = 0.59
 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.60
 AREA-AVERAGED Ap = 0.46
 EFFECTIVE STREAM AREA(ACRES) = 124.30
 TOTAL STREAM AREA(ACRES) = 124.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 53.92

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	98.49	37.40	0.501	0.60(0.29)	0.48	306.0	430.00
1	89.62	40.57	0.477	0.60(0.29)	0.49	315.2	400.00
2	53.92	27.84	0.590	0.60(0.28)	0.46	124.3	413.00

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	140.32	27.84	0.590	0.60(0.28)	0.48	352.0	413.00
2	144.23	37.40	0.501	0.60(0.29)	0.48	430.3	430.00
3	133.16	40.57	0.477	0.60(0.29)	0.48	439.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 144.23 Tc(MIN.) = 37.40

EFFECTIVE AREA(ACRES) = 430.29 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 439.5
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

 FLOW PROCESS FROM NODE 427.00 TO NODE 428.00 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) = 275.00
 FLOW LENGTH(FEET) = 789.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.42
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 144.23
 PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 37.99
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 428.00 = 11352.00 FEET.

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 439.5 TC(MIN.) = 37.99
 EFFECTIVE AREA(ACRES) = 430.29 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.477
 PEAK FLOW RATE(CFS) = 144.23

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	140.32	28.43	0.582	0.60(0.28)	0.48	352.0	413.00
2	144.23	37.99	0.496	0.60(0.29)	0.48	430.3	430.00
3	133.16	41.18	0.473	0.60(0.29)	0.48	439.5	400.00

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:

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92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA D ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 5-YR EV SEPTEMBER 2018 CCHI *

FILE NAME: PA3D05EV.DAT
TIME/DATE OF STUDY: 11:55 09/25/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 5.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 2.180
- 2) 10.00; 1.510
- 3) 15.00; 1.200
- 4) 20.00; 1.020
- 5) 25.00; 0.900
- 6) 30.00; 0.830
- 7) 40.00; 0.690
- 8) 50.00; 0.610
- 9) 60.00; 0.550
- 10) 90.00; 0.440
- 11) 120.00; 0.370
- 12) 180.00; 0.310
- 13) 360.00; 0.210
- 14) 1200.00; 0.090

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) (FT)	MANNING HIKE 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 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) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 605.00 DOWNSTREAM(FEET) = 586.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.417
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.856

D-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.)
RESIDENTIAL ".4 DWELLING/ACRE"	-	1.20	0.50	0.900	56	8.77
RESIDENTIAL "3-4 DWELLINGS/ACRE"	-	1.30	0.50	0.600	56	7.42
PUBLIC PARK	-	2.40	0.50	0.850	56	8.70

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.796
SUBAREA RUNOFF(CFS) = 6.43
TOTAL AREA(ACRES) = 4.90 PEAK FLOW RATE(CFS) = 6.43

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) = 586.00 DOWNSTREAM ELEVATION(FEET) = 583.00
STREET LENGTH(FEET) = 333.00 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) = 10.53
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 14.57
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.52
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.06
STREET FLOW TRAVEL TIME(MIN.) = 2.20 Tc(MIN.) = 9.62

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.561 D-2
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	0.40	0.50	0.850	-
USER-DEFINED	-	1.90	0.50	0.400	-
USER-DEFINED	-	4.70	0.50	0.600	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.565
 SUBAREA AREA (ACRES) = 7.10 SUBAREA RUNOFF (CFS) = 8.17
 EFFECTIVE AREA (ACRES) = 12.00 AREA-AVERAGED Fm (INCH/HR) = 0.33
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.66
 TOTAL AREA (ACRES) = 12.0 PEAK FLOW RATE (CFS) = 13.30

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.45 HALFSTREET FLOOD WIDTH (FEET) = 16.05
 FLOW VELOCITY (FEET/SEC.) = 2.66 DEPTH*VELOCITY (FT*FT/SEC.) = 1.20
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.00 = 663.00 FEET.

 FLOW PROCESS FROM NODE 402.00 TO NODE 402.50 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<
 =====

UPSTREAM ELEVATION (FEET) = 583.00 DOWNSTREAM ELEVATION (FEET) = 580.00
 STREET LENGTH (FEET) = 315.00 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) = 15.74
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH (FEET) = 0.47
 HALFSTREET FLOOD WIDTH (FEET) = 16.99
 AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.84
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.32
 STREET FLOW TRAVEL TIME (MIN.) = 1.85 Tc (MIN.) = 11.47

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.419 D-3
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.50	0.850	-
USER-DEFINED	-	1.80	0.50	0.600	-
USER-DEFINED	-	0.10	0.50	0.500	-
USER-DEFINED	-	2.30	0.50	0.400	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
 SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 4.89
 EFFECTIVE AREA (ACRES) = 16.70 AREA-AVERAGED Fm (INCH/HR) = 0.31

AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.62
 TOTAL AREA (ACRES) = 16.7 PEAK FLOW RATE (CFS) = 16.65

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.47 HALFSTREET FLOOD WIDTH (FEET) = 17.38
 FLOW VELOCITY (FEET/SEC.) = 2.88 DEPTH*VELOCITY (FT*FT/SEC.) = 1.36
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.50 = 978.00 FEET.

 FLOW PROCESS FROM NODE 402.50 TO NODE 403.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<<
 =====

UPSTREAM ELEVATION (FEET) = 580.00 DOWNSTREAM ELEVATION (FEET) = 579.00
 STREET LENGTH (FEET) = 394.00 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) = 18.01
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH (FEET) = 0.58
 HALFSTREET FLOOD WIDTH (FEET) = 23.40
 AVERAGE FLOW VELOCITY (FEET/SEC.) = 1.77
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.03
 STREET FLOW TRAVEL TIME (MIN.) = 3.71 Tc (MIN.) = 15.18

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.194 D-3.1
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.50	0.850	-
USER-DEFINED	-	0.10	0.50	0.600	-
USER-DEFINED	-	2.80	0.50	0.400	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.435
 SUBAREA AREA (ACRES) = 3.10 SUBAREA RUNOFF (CFS) = 2.72
 EFFECTIVE AREA (ACRES) = 19.80 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.59
 TOTAL AREA (ACRES) = 19.8 PEAK FLOW RATE (CFS) = 16.65
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.57 HALFSTREET FLOOD WIDTH (FEET) = 22.70
 FLOW VELOCITY (FEET/SEC.) = 1.74 DEPTH*VELOCITY (FT*FT/SEC.) = 0.99
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 1372.00 FEET.

 FLOW PROCESS FROM NODE 403.00 TO NODE 404.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 579.00 DOWNSTREAM ELEVATION(FEET) = 560.00
STREET LENGTH(FEET) = 974.00 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) = 20.22
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.45
HALFSTREET FLOOD WIDTH(FEET) = 16.29
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.94
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.79

STREET FLOW TRAVEL TIME(MIN.) = 4.12 Tc(MIN.) = 19.29

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.046

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	5.80	0.50	0.100	-
USER-DEFINED	-	0.70	0.50	0.100	-
USER-DEFINED	-	1.10	0.50	0.850	-
USER-DEFINED	-	0.70	0.50	0.850	-
USER-DEFINED	-	0.10	0.50	0.200	-
USER-DEFINED	-	0.30	0.50	0.400	-

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SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.267
SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 7.14
EFFECTIVE AREA(ACRES) = 28.50 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 28.5 PEAK FLOW RATE(CFS) = 20.49

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.45 HALFSTREET FLOOD WIDTH(FEET) = 16.37
FLOW VELOCITY(FEET/SEC.) = 3.96 DEPTH*VELOCITY(FT*FT/SEC.) = 1.80
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 404.00 = 2346.00 FEET.

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.29
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.046

D-5

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.10	0.50	0.600	-
USER-DEFINED	-	2.30	0.50	0.900	-
USER-DEFINED	-	2.70	0.50	0.500	-

USER-DEFINED - 3.40 0.50 0.400 -
USER-DEFINED - 5.30 0.50 0.200 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.432
SUBAREA AREA(ACRES) = 13.90 SUBAREA RUNOFF(CFS) = 10.38
EFFECTIVE AREA(ACRES) = 42.40 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 42.4 PEAK FLOW RATE(CFS) = 30.87

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.29
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.046

D-5

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	0.20	0.50	0.900	-

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.29
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.046

D-6

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.200	-
USER-DEFINED	-	0.20	0.50	0.400	-
USER-DEFINED	-	1.50	0.50	0.850	-
USER-DEFINED	-	2.50	0.50	0.500	-

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.29
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.046

SUBAREA LOSS RATE DATA(AMC II):

D-6

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.80	0.50	0.850	-
USER-DEFINED	-	3.00	0.50	0.900	-
USER-DEFINED	-	6.40	0.50	0.500	-
USER-DEFINED	-	6.70	0.50	0.600	-
USER-DEFINED	-	4.30	0.50	0.900	-
USER-DEFINED	-	8.70	0.50	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.671
SUBAREA AREA (ACRES) = 31.90 SUBAREA RUNOFF (CFS) = 20.39
EFFECTIVE AREA (ACRES) = 79.00 AREA-AVERAGED Fm (INCH/HR) = 0.28
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.56
TOTAL AREA (ACRES) = 79.0 PEAK FLOW RATE (CFS) = 54.40

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 19.29
RAINFALL INTENSITY (INCH/HR) = 1.05
AREA-AVERAGED Fm (INCH/HR) = 0.28
AREA-AVERAGED Fp (INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.56
EFFECTIVE STREAM AREA (ACRES) = 79.00
TOTAL STREAM AREA (ACRES) = 79.00
PEAK FLOW RATE (CFS) AT CONFLUENCE = 54.40

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) = 729.00 DOWNSTREAM (FEET) = 630.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)] ** 0.20
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.120
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.628

OD-1

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "CHAPARRAL,NARROWLEAF"	-	0.10	0.50	1.000	56	9.12
NATURAL FAIR COVER "OPEN BRUSH"	-	1.30	0.50	1.000	56	9.12
NATURAL FAIR COVER "OPEN BRUSH"	-	0.10	0.50	1.000	56	9.12

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 1.52
TOTAL AREA (ACRES) = 1.50 PEAK FLOW RATE (CFS) = 1.52

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.541

OD-2

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.70	0.50	1.000	-
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.10	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 2.41
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.04
AVERAGE FLOW DEPTH (FEET) = 0.40 TRAVEL TIME (MIN.) = 0.65
Tc (MIN.) = 9.77
SUBAREA AREA (ACRES) = 1.90 SUBAREA RUNOFF (CFS) = 1.78
EFFECTIVE AREA (ACRES) = 3.40 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 3.4 PEAK FLOW RATE (CFS) = 3.18

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.45 FLOW VELOCITY (FEET/SEC.) = 5.35
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) = 570.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 243.00 CHANNEL SLOPE = 0.1111
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 20.00
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.476

OD-3

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	3.80	0.50	1.000	-
USER-DEFINED	-	0.30	0.50	1.000	-
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.20	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 5.16
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.20
AVERAGE FLOW DEPTH (FEET) = 0.58 TRAVEL TIME (MIN.) = 0.78
Tc (MIN.) = 10.55
SUBAREA AREA (ACRES) = 4.50 SUBAREA RUNOFF (CFS) = 3.96
EFFECTIVE AREA (ACRES) = 7.90 AREA-AVERAGED Fm (INCH/HR) = 0.50

AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 7.9 PEAK FLOW RATE (CFS) = 6.94

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.64 FLOW VELOCITY (FEET/SEC.) = 5.59
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.00 = 768.00 FEET.

FLOW PROCESS FROM NODE 433.00 TO NODE 433.10 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) = 564.00
FLOW LENGTH (FEET) = 1076.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.8 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 4.79
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 6.94
PIPE TRAVEL TIME (MIN.) = 3.75 Tc (MIN.) = 14.29
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.10 = 1844.00 FEET.

FLOW PROCESS FROM NODE 433.10 TO NODE 433.10 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 14.29
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.244
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.50 0.50 0.850 -
USER-DEFINED - 1.70 0.50 0.900 -
USER-DEFINED - 5.40 0.50 0.500 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.613
SUBAREA AREA (ACRES) = 7.60 SUBAREA RUNOFF (CFS) = 6.41
EFFECTIVE AREA (ACRES) = 15.50 AREA-AVERAGED Fm (INCH/HR) = 0.40
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.81
TOTAL AREA (ACRES) = 15.5 PEAK FLOW RATE (CFS) = 11.70

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FLOW PROCESS FROM NODE 433.10 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) = 564.00 DOWNSTREAM (FEET) = 560.00
FLOW LENGTH (FEET) = 830.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 5.25
ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 11.70
PIPE TRAVEL TIME (MIN.) = 2.63 Tc (MIN.) = 16.93
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION (MIN.) = 16.93
RAINFALL INTENSITY (INCH/HR) = 1.13
AREA-AVERAGED Fm (INCH/HR) = 0.40
AREA-AVERAGED Fp (INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.81
EFFECTIVE STREAM AREA (ACRES) = 15.50
TOTAL STREAM AREA (ACRES) = 15.50
PEAK FLOW RATE (CFS) AT CONFLUENCE = 11.70

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	54.40	19.29	1.046	0.50 (0.28)	0.56	79.0	400.00
2	11.70	16.93	1.131	0.50 (0.40)	0.81	15.5	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	64.75	16.93	1.131	0.50 (0.30)	0.61	84.8	430.00
2	64.73	19.29	1.046	0.50 (0.30)	0.60	94.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 64.75 Tc (MIN.) = 16.93
EFFECTIVE AREA (ACRES) = 84.82 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.61
TOTAL AREA (ACRES) = 94.5
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

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) = 560.00 DOWNSTREAM (FEET) = 557.00
FLOW LENGTH (FEET) = 377.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.7 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 9.56
ESTIMATED PIPE DIAMETER (INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 64.75
PIPE TRAVEL TIME (MIN.) = 0.66 Tc (MIN.) = 17.58
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 405.00 = 3051.00 FEET.

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 17.58
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.107
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.30	0.50	0.100	-
USER-DEFINED	-	0.90	0.50	0.850	-
USER-DEFINED	-	0.20	0.50	0.200	-
USER-DEFINED	-	4.50	0.50	0.500	-
USER-DEFINED	-	3.20	0.50	0.400	-
USER-DEFINED	-	1.20	0.50	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.406
 SUBAREA AREA(ACRES) = 11.30 SUBAREA RUNOFF(CFS) = 9.19
 EFFECTIVE AREA(ACRES) = 96.12 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.58
 TOTAL AREA(ACRES) = 105.8 PEAK FLOW RATE(CFS) = 70.56

D-9

 FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 17.58
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.107
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.50	0.850	-
USER-DEFINED	-	0.10	0.50	0.200	-
USER-DEFINED	-	4.20	0.50	0.500	-
USER-DEFINED	-	3.80	0.50	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.459
 SUBAREA AREA(ACRES) = 8.30 SUBAREA RUNOFF(CFS) = 6.55
 EFFECTIVE AREA(ACRES) = 104.42 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.57
 TOTAL AREA(ACRES) = 114.1 PEAK FLOW RATE(CFS) = 77.11

D-9

 FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 17.58
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.107
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.80	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.600	-
USER-DEFINED	-	5.20	0.50	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.307
 SUBAREA AREA(ACRES) = 10.10 SUBAREA RUNOFF(CFS) = 8.67
 EFFECTIVE AREA(ACRES) = 114.52 AREA-AVERAGED Fm(INCH/HR) = 0.27
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.55
 TOTAL AREA(ACRES) = 124.2 PEAK FLOW RATE(CFS) = 85.78

D-7

 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) = 557.00 DOWNSTREAM(FEET) = 535.00
 FLOW LENGTH(FEET) = 525.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.36
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 85.78
 PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 18.04
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 406.00 = 3576.00 FEET.

 FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.04
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.091
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.30	0.50	0.900	-
USER-DEFINED	-	0.90	0.50	0.850	-
USER-DEFINED	-	8.70	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	0.10	0.50	0.600	-
USER-DEFINED	-	0.40	0.50	0.850	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.311
 SUBAREA AREA(ACRES) = 10.50 SUBAREA RUNOFF(CFS) = 8.84
 EFFECTIVE AREA(ACRES) = 125.02 AREA-AVERAGED Fm(INCH/HR) = 0.26
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 134.7 PEAK FLOW RATE(CFS) = 92.94

D-10

 FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.04
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.091
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	9.00	0.50	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA(ACRES) = 9.00 SUBAREA RUNOFF(CFS) = 8.02
 EFFECTIVE AREA(ACRES) = 134.02 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 143.7 PEAK FLOW RATE(CFS) = 100.96

D-10

FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.04
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.091 **D-11**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 0.30 0.50 0.600 -
 USER-DEFINED - 0.50 0.50 0.900 -
 USER-DEFINED - 18.70 0.50 0.600 -
 USER-DEFINED - 1.00 0.50 0.600 -
 USER-DEFINED - 0.10 0.50 0.900 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.609
 SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 14.58
 EFFECTIVE AREA(ACRES) = 154.62 AREA-AVERAGED Fm(INCH/HR) = 0.26
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 164.3 PEAK FLOW RATE(CFS) = 115.54

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) = 535.00 DOWNSTREAM(FEET) = 510.00
 FLOW LENGTH(FEET) = 311.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 26.68
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 115.54
 PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 18.23
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 407.00 = 3887.00 FEET.

FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.23
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.084 **D-11.1**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 0.10 0.50 0.500 -
 USER-DEFINED - 1.10 0.50 0.900 -
 USER-DEFINED - 2.20 0.50 0.100 -
 USER-DEFINED - 0.40 0.50 0.900 -
 USER-DEFINED - 1.10 0.50 0.100 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.353
 SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 4.00
 EFFECTIVE AREA(ACRES) = 159.52 AREA-AVERAGED Fm(INCH/HR) = 0.26
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 169.2 PEAK FLOW RATE(CFS) = 118.56

FLOW PROCESS FROM NODE 407.00 TO NODE 408.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 510.00 DOWNSTREAM(FEET) = 480.00
 FLOW LENGTH(FEET) = 624.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.05
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 118.56
 PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 18.70
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 408.00 = 4511.00 FEET.

FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.70
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.067 **D-12**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 0.70 0.50 0.900 -
 USER-DEFINED - 1.60 0.50 0.600 -
 USER-DEFINED - 1.40 0.50 0.100 -
 USER-DEFINED - 4.80 0.50 0.900 -
 USER-DEFINED - 4.20 0.50 0.600 -
 USER-DEFINED - 2.20 0.50 0.500 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.649
 SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 9.95
 EFFECTIVE AREA(ACRES) = 174.42 AREA-AVERAGED Fm(INCH/HR) = 0.26
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 184.1 PEAK FLOW RATE(CFS) = 126.08

FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.70
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.067 **D-12**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 0.30 0.50 0.100 -
 USER-DEFINED - 2.10 0.50 0.900 -
 USER-DEFINED - 6.60 0.50 0.600 -
 USER-DEFINED - 2.00 0.50 0.500 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.625
 SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 7.46
 EFFECTIVE AREA(ACRES) = 185.42 AREA-AVERAGED Fm(INCH/HR) = 0.27
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 195.1 PEAK FLOW RATE(CFS) = 133.54

FLOW PROCESS FROM NODE 408.00 TO NODE 409.00 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) = 460.00
FLOW LENGTH(FEET) = 368.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 26.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.63
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 133.54
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 18.96
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 409.00 = 4879.00 FEET.

FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.96
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.057

D-13

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 USER-DEFINED entries with various values.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.658
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 3.80
EFFECTIVE AREA(ACRES) = 191.22 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 200.9 PEAK FLOW RATE(CFS) = 135.78

FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.96
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.057

D-13

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 USER-DEFINED entries with various values.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.616
SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 6.13

EFFECTIVE AREA(ACRES) = 200.32 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 210.0 PEAK FLOW RATE(CFS) = 141.92

FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 18.96
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.057

D-13

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 USER-DEFINED entries with various values.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 4.04
EFFECTIVE AREA(ACRES) = 206.12 AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 215.8 PEAK FLOW RATE(CFS) = 145.96

FLOW PROCESS FROM NODE 409.00 TO NODE 410.00 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) = 445.00
FLOW LENGTH(FEET) = 291.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 26.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.93
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 145.96
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 19.16
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 410.00 = 5170.00 FEET.

FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.16
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.050

D-14

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 USER-DEFINED entries with various values.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456
SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 7.40
EFFECTIVE AREA(ACRES) = 216.12 AREA-AVERAGED Fm(INCH/HR) = 0.27

AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.54
TOTAL AREA (ACRES) = 225.8 PEAK FLOW RATE (CFS) = 152.01

FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.16
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.050 **D-14**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 1.10 0.50 0.850 -
USER-DEFINED - 0.10 0.50 0.200 -
USER-DEFINED - 4.00 0.50 0.600 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.645
SUBAREA AREA (ACRES) = 5.20 SUBAREA RUNOFF (CFS) = 3.40
EFFECTIVE AREA (ACRES) = 221.32 AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.54
TOTAL AREA (ACRES) = 231.0 PEAK FLOW RATE (CFS) = 155.41

FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.16
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.050 **D-14.1**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 2.10 0.50 0.200 -
USER-DEFINED - 8.90 0.50 0.200 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF (CFS) = 9.41
EFFECTIVE AREA (ACRES) = 232.32 AREA-AVERAGED Fm (INCH/HR) = 0.26
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.52
TOTAL AREA (ACRES) = 242.0 PEAK FLOW RATE (CFS) = 164.81

FLOW PROCESS FROM NODE 410.00 TO NODE 411.00 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) = 425.00
FLOW LENGTH (FEET) = 324.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 26.32
ESTIMATED PIPE DIAMETER (INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 164.81
PIPE TRAVEL TIME (MIN.) = 0.21 Tc (MIN.) = 19.37
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 411.00 = 5494.00 FEET.

FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.37
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.043 **D-15**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.10 0.50 0.200 -
USER-DEFINED - 0.20 0.50 0.100 -
USER-DEFINED - 1.70 0.50 0.850 -
USER-DEFINED - 0.70 0.50 0.200 -
USER-DEFINED - 0.20 0.50 0.600 -
USER-DEFINED - 0.70 0.50 0.100 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.504
SUBAREA AREA (ACRES) = 3.60 SUBAREA RUNOFF (CFS) = 2.56
EFFECTIVE AREA (ACRES) = 235.92 AREA-AVERAGED Fm (INCH/HR) = 0.26
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.52
TOTAL AREA (ACRES) = 245.6 PEAK FLOW RATE (CFS) = 165.83

FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.37
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.043 **D-15**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.90 0.50 0.850 -
USER-DEFINED - 8.80 0.50 0.200 -
USER-DEFINED - 0.20 0.50 0.600 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.267
SUBAREA AREA (ACRES) = 9.90 SUBAREA RUNOFF (CFS) = 8.10
EFFECTIVE AREA (ACRES) = 245.82 AREA-AVERAGED Fm (INCH/HR) = 0.26
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.51
TOTAL AREA (ACRES) = 255.5 PEAK FLOW RATE (CFS) = 173.93

FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 19.37
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.043 **D-15.1**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.50 0.50 0.200 -
USER-DEFINED - 0.10 0.50 0.900 -
USER-DEFINED - 2.10 0.50 0.600 -
USER-DEFINED - 0.70 0.50 0.200 -
USER-DEFINED - 0.10 0.50 0.900 -
USER-DEFINED - 4.30 0.50 0.600 -

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.546
 SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 5.40
 EFFECTIVE AREA(ACRES) = 253.62 AREA-AVERAGED Fm(INCH/HR) = 0.26
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 263.3 PEAK FLOW RATE(CFS) = 179.33

 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) = 425.00 DOWNSTREAM(FEET) = 392.00
 FLOW LENGTH(FEET) = 641.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 25.16
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 179.33
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 19.79
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 412.00 = 6135.00 FEET.

 FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.79
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.027

D-16

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	5.30	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	1.10	0.50	0.100	-
USER-DEFINED	-	7.30	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.198
 SUBAREA AREA(ACRES) = 14.50 SUBAREA RUNOFF(CFS) = 12.12
 EFFECTIVE AREA(ACRES) = 268.12 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 277.8 PEAK FLOW RATE(CFS) = 187.96

 FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.79
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.027

D-32

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.50	0.200	-
USER-DEFINED	-	0.20	0.50	0.100	-
USER-DEFINED	-	4.10	0.50	0.200	-

USER-DEFINED - 0.60 0.50 0.900 -
 USER-DEFINED - 3.10 0.50 0.400 -
 USER-DEFINED - 0.50 0.50 0.200 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.317
 SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 6.80
 EFFECTIVE AREA(ACRES) = 276.82 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 286.5 PEAK FLOW RATE(CFS) = 194.76

 FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.79
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.027

D-32

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.50	0.900	-
USER-DEFINED	-	4.00	0.50	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456
 SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 3.24
 EFFECTIVE AREA(ACRES) = 281.32 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 291.0 PEAK FLOW RATE(CFS) = 198.00

 FLOW PROCESS FROM NODE 412.00 TO NODE 420.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 392.00 DOWNSTREAM(FEET) = 350.00
 FLOW LENGTH(FEET) = 1358.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.82
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 198.00
 PIPE TRAVEL TIME(MIN.) = 1.09 Tc(MIN.) = 20.88
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 420.00 = 7493.00 FEET.

 FLOW PROCESS FROM NODE 420.00 TO NODE 420.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 20.88
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.999

D-35

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.50	0.100	-
USER-DEFINED	-	1.30	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.105
 SUBAREA AREA (ACRES) = 1.90 SUBAREA RUNOFF (CFS) = 1.62
 EFFECTIVE AREA (ACRES) = 283.22 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 292.9 PEAK FLOW RATE (CFS) = 198.00
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 420.00 TO NODE 421.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 346.00 DOWNSTREAM(FEET) = 320.00
 CHANNEL LENGTH THRU SUBAREA (FEET) = 1617.00 CHANNEL SLOPE = 0.0161
 CHANNEL BASE (FEET) = 200.00 "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.030 MAXIMUM DEPTH (FEET) = 20.00
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 0.833

D-34

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	6.90	0.50	0.100	-
USER-DEFINED	-	3.60	0.50	0.100	-
USER-DEFINED	-	2.20	0.50	0.100	-
USER-DEFINED	-	0.70	0.50	0.900	-
USER-DEFINED	-	0.40	0.50	0.900	-
USER-DEFINED	-	1.30	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.227
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 202.89
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.03
 AVERAGE FLOW DEPTH (FEET) = 0.33 TRAVEL TIME (MIN.) = 8.89
 Tc (MIN.) = 29.77
 SUBAREA AREA (ACRES) = 15.10 SUBAREA RUNOFF (CFS) = 9.78
 EFFECTIVE AREA (ACRES) = 298.32 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.47
 TOTAL AREA (ACRES) = 308.0 PEAK FLOW RATE (CFS) = 198.00
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.33 FLOW VELOCITY (FEET/SEC.) = 2.98
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 421.00 = 9110.00 FEET.

 FLOW PROCESS FROM NODE 421.00 TO NODE 421.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 29.77
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 0.833

D-34

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.10	0.50	0.850	-
USER-DEFINED	-	2.50	0.50	0.850	-
USER-DEFINED	-	3.60	0.50	0.850	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850

SUBAREA AREA (ACRES) = 7.20 SUBAREA RUNOFF (CFS) = 2.64
 EFFECTIVE AREA (ACRES) = 305.52 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 315.2 PEAK FLOW RATE (CFS) = 198.00
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 421.00 TO NODE 427.00 IS CODE = 31

>>>>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) = 1453.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 47.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 11.89
 ESTIMATED PIPE DIAMETER (INCH) = 60.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 198.00
 PIPE TRAVEL TIME (MIN.) = 2.04 Tc (MIN.) = 31.80
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

 FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 31.80
 RAINFALL INTENSITY (INCH/HR) = 0.80
 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.50
 AREA-AVERAGED Ap = 0.48
 EFFECTIVE STREAM AREA (ACRES) = 305.52
 TOTAL STREAM AREA (ACRES) = 315.20
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 198.00

 FLOW PROCESS FROM NODE 413.00 TO NODE 414.00 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) = 515.00 DOWNSTREAM (FEET) = 497.00

Tc = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 5.533
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.109

D-21

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	-	0.10	0.50	0.100	56	5.53
PUBLIC PARK	-	1.10	0.50	0.850	56	8.79
RESIDENTIAL "3-4 DWELLINGS/ACRE"	-	0.10	0.50	0.600	56	7.50
COMMERCIAL	-	0.10	0.50	0.100	56	5.53
PUBLIC PARK	-	0.30	0.50	0.850	56	8.79

RESIDENTIAL
"3-4 DWELLINGS/ACRE" - 1.50 0.50 0.600 56 7.50
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.678
SUBAREA RUNOFF(CFS) = 5.10
TOTAL AREA (ACRES) = 3.20 PEAK FLOW RATE (CFS) = 5.10

FLOW PROCESS FROM NODE 414.00 TO NODE 414.10 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 497.00 DOWNSTREAM ELEVATION(FEET) = 493.00
STREET LENGTH(FEET) = 371.00 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) = 8.23
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.62
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.55
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.99
STREET FLOW TRAVEL TIME(MIN.) = 2.43 Tc(MIN.) = 7.96
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.783

D-22

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.40	0.50	0.850	-
USER-DEFINED	-	1.40	0.50	0.600	-
USER-DEFINED	-	2.00	0.50	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.673
SUBAREA AREA(ACRES) = 4.80 SUBAREA RUNOFF(CFS) = 6.25
EFFECTIVE AREA(ACRES) = 8.00 AREA-AVERAGED Fm(INCH/HR) = 0.34
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.68
TOTAL AREA(ACRES) = 8.0 PEAK FLOW RATE(CFS) = 10.41

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 13.95
FLOW VELOCITY(FEET/SEC.) = 2.70 DEPTH*VELOCITY(FT*FT/SEC.) = 1.11
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.10 = 701.00 FEET.

FLOW PROCESS FROM NODE 414.10 TO NODE 414.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 493.00 DOWNSTREAM ELEVATION(FEET) = 490.00
STREET LENGTH(FEET) = 476.00 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) = 13.36
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 17.30
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.33
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.10
STREET FLOW TRAVEL TIME(MIN.) = 3.41 Tc(MIN.) = 11.37
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.425

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.200	-
USER-DEFINED	-	0.50	0.50	0.100	-
USER-DEFINED	-	3.40	0.50	0.600	-
USER-DEFINED	-	0.40	0.50	0.100	-
USER-DEFINED	-	1.20	0.50	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.513
SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 5.89
EFFECTIVE AREA(ACRES) = 13.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.61
TOTAL AREA(ACRES) = 13.6 PEAK FLOW RATE(CFS) = 13.72

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.54
FLOW VELOCITY(FEET/SEC.) = 2.33 DEPTH*VELOCITY(FT*FT/SEC.) = 1.11
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.20 = 1177.00 FEET.

FLOW PROCESS FROM NODE 414.20 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) = 490.00 DOWNSTREAM(FEET) = 465.00
FLOW LENGTH(FEET) = 488.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.38
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.72
PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 11.97
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 415.00 = 1665.00 FEET.

FLOW PROCESS FROM NODE 415.00 TO NODE 415.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 11.97
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.388
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	2.30	0.50	0.600	-
USER-DEFINED	-	0.10	0.50	0.200	-
USER-DEFINED	-	0.80	0.50	0.100	-
USER-DEFINED	-	3.20	0.50	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.537
 SUBAREA AREA (ACRES) = 6.50 SUBAREA RUNOFF (CFS) = 6.55
 EFFECTIVE AREA (ACRES) = 20.10 AREA-AVERAGED Fm (INCH/HR) = 0.29
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.59
 TOTAL AREA (ACRES) = 20.1 PEAK FLOW RATE (CFS) = 19.81

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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) = 465.00 DOWNSTREAM (FEET) = 440.00
 FLOW LENGTH (FEET) = 497.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.2 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 14.29
 ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 19.81
 PIPE TRAVEL TIME (MIN.) = 0.58 Tc (MIN.) = 12.55
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 416.00 = 2162.00 FEET.

FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 12.55
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.352
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.80	0.50	0.100	-
USER-DEFINED	-	0.40	0.50	0.900	-
USER-DEFINED	-	3.70	0.50	0.400	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.392
 SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 5.10
 EFFECTIVE AREA (ACRES) = 25.00 AREA-AVERAGED Fm (INCH/HR) = 0.27
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.55
 TOTAL AREA (ACRES) = 25.0 PEAK FLOW RATE (CFS) = 24.26

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FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 12.55
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.352
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.80	0.50	0.200	-
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	1.60	0.50	0.600	-
USER-DEFINED	-	3.60	0.50	0.200	-
USER-DEFINED	-	3.00	0.50	0.600	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.389
 SUBAREA AREA (ACRES) = 10.10 SUBAREA RUNOFF (CFS) = 10.52
 EFFECTIVE AREA (ACRES) = 35.10 AREA-AVERAGED Fm (INCH/HR) = 0.25
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.50
 TOTAL AREA (ACRES) = 35.1 PEAK FLOW RATE (CFS) = 34.77

D-25

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) = 440.00 DOWNSTREAM (FEET) = 420.00
 FLOW LENGTH (FEET) = 437.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.6 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 16.07
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 34.77
 PIPE TRAVEL TIME (MIN.) = 0.45 Tc (MIN.) = 13.01
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 417.00 = 2599.00 FEET.

FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.01
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.324
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.50	0.50	0.200	-
USER-DEFINED	-	0.70	0.50	0.100	-
USER-DEFINED	-	3.40	0.50	0.200	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.187
 SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 6.20
 EFFECTIVE AREA (ACRES) = 40.70 AREA-AVERAGED Fm (INCH/HR) = 0.23
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 40.7 PEAK FLOW RATE (CFS) = 40.08

D-27

FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 13.01

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.324 **D-28**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.60	0.50	0.100	-
USER-DEFINED	-	4.00	0.50	0.200	-
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	1.50	0.50	0.100	-
USER-DEFINED	-	2.10	0.50	0.850	-
USER-DEFINED	-	1.60	0.50	0.200	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.264
SUBAREA AREA(ACRES) = 14.00 SUBAREA RUNOFF(CFS) = 15.01
EFFECTIVE AREA(ACRES) = 54.70 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 54.7 PEAK FLOW RATE(CFS) = 55.10

FLOW PROCESS FROM NODE 417.00 TO NODE 418.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 420.00 DOWNSTREAM(FEET) = 400.00
FLOW LENGTH(FEET) = 619.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.79
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 55.10
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 13.66
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 418.00 = 3218.00 FEET.

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 13.66

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.283 **D-30**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.70	0.50	0.100	-
USER-DEFINED	-	2.10	0.50	0.100	-
USER-DEFINED	-	3.90	0.50	0.100	-
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	5.50	0.50	0.500	-
USER-DEFINED	-	3.20	0.50	0.500	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.333
SUBAREA AREA(ACRES) = 15.60 SUBAREA RUNOFF(CFS) = 15.67
EFFECTIVE AREA(ACRES) = 70.30 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 70.3 PEAK FLOW RATE(CFS) = 68.78

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 13.66

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.283 **D-30**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.30	0.50	0.500	-
USER-DEFINED	-	0.40	0.50	0.400	-
USER-DEFINED	-	3.10	0.50	0.400	-
USER-DEFINED	-	0.20	0.50	0.400	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.407
SUBAREA AREA(ACRES) = 4.00 SUBAREA RUNOFF(CFS) = 3.89
EFFECTIVE AREA(ACRES) = 74.30 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 74.3 PEAK FLOW RATE(CFS) = 72.66

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 13.66

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.283 **D-29**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	2.20	0.50	0.200	-
USER-DEFINED	-	3.70	0.50	0.100	-
USER-DEFINED	-	3.50	0.50	0.200	-
USER-DEFINED	-	0.70	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.200	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.154
SUBAREA AREA(ACRES) = 10.80 SUBAREA RUNOFF(CFS) = 11.72
EFFECTIVE AREA(ACRES) = 85.10 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 85.1 PEAK FLOW RATE(CFS) = 84.39

FLOW PROCESS FROM NODE 418.00 TO NODE 425.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 320.00
FLOW LENGTH(FEET) = 1179.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.10
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 84.39
PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 14.51
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 425.00 = 4397.00 FEET.

FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 14.51

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.230

D-33

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	0.40	0.50	0.100	-
USER-DEFINED	-	0.90	0.50	0.100	-
USER-DEFINED	-	5.30	0.50	0.850	-
USER-DEFINED	-	3.10	0.50	0.850	-
USER-DEFINED	-	9.10	0.50	0.850	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.777

SUBAREA AREA(ACRES) = 19.40 SUBAREA RUNOFF(CFS) = 14.70

EFFECTIVE AREA(ACRES) = 104.50 AREA-AVERAGED Fm(INCH/HR) = 0.22

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.44

TOTAL AREA(ACRES) = 104.5 PEAK FLOW RATE(CFS) = 95.05

FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 14.51

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.230

D-33

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.30	0.50	0.900	-
USER-DEFINED	-	1.90	0.50	0.900	-
USER-DEFINED	-	1.90	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900

SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 3.58

EFFECTIVE AREA(ACRES) = 109.60 AREA-AVERAGED Fm(INCH/HR) = 0.23

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46

TOTAL AREA(ACRES) = 109.6 PEAK FLOW RATE(CFS) = 98.63

FLOW PROCESS FROM NODE 425.00 TO NODE 426.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM(FEET) = 320.00 DOWNSTREAM(FEET) = 316.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 870.00 CHANNEL SLOPE = 0.0046

GIVEN CHANNEL BASE(FEET) = 200.00 CHANNEL FREEBOARD(FEET) = 1.0

"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030

*ESTIMATED CHANNEL HEIGHT(FEET) = 1.33

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.931

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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LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
USER-DEFINED	-	3.40	0.50	0.100	-
USER-DEFINED	-	3.30	0.50	0.100	-
USER-DEFINED	-	0.80	0.50	0.850	-
USER-DEFINED	-	0.30	0.50	0.850	-
USER-DEFINED	-	0.90	0.50	0.900	-
USER-DEFINED	-	2.30	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.408

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 102.23

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.57

AVERAGE FLOW DEPTH(FEET) = 0.32 TRAVEL TIME(MIN.) = 9.22

Tc(MIN.) = 23.73

SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 7.19

EFFECTIVE AREA(ACRES) = 120.60 AREA-AVERAGED Fm(INCH/HR) = 0.23

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46

TOTAL AREA(ACRES) = 120.6 PEAK FLOW RATE(CFS) = 98.63

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

GIVEN CHANNEL BASE(FEET) = 200.00 CHANNEL FREEBOARD(FEET) = 1.0

"Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030

*ESTIMATED CHANNEL HEIGHT(FEET) = 1.32

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.32 FLOW VELOCITY(FEET/SEC.) = 1.55

LONGEST FLOWPATH FROM NODE 413.00 TO NODE 426.00 = 5267.00 FEET.

FLOW PROCESS FROM NODE 426.00 TO NODE 426.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 23.73

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.931

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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
USER-DEFINED	-	1.50	0.50	0.100	-
USER-DEFINED	-	1.70	0.50	0.900	-
USER-DEFINED	-	0.50	0.50	0.850	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.569

SUBAREA AREA(ACRES) = 3.70 SUBAREA RUNOFF(CFS) = 2.15

EFFECTIVE AREA(ACRES) = 124.30 AREA-AVERAGED Fm(INCH/HR) = 0.23

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.46

TOTAL AREA(ACRES) = 124.3 PEAK FLOW RATE(CFS) = 98.63

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 426.00 TO NODE 427.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 316.00 DOWNSTREAM(FEET) = 310.00

FLOW LENGTH(FEET) = 321.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 14.65

ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 98.63
 PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 24.09
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 427.00 = 5588.00 FEET.

FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 24.09
 RAINFALL INTENSITY(INCH/HR) = 0.92
 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.50
 AREA-AVERAGED Ap = 0.46
 EFFECTIVE STREAM AREA(ACRES) = 124.30
 TOTAL STREAM AREA(ACRES) = 124.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 98.63

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	198.00	31.80	0.805	0.50(0.24)	0.48	305.5	430.00
1	188.77	34.44	0.768	0.50(0.24)	0.49	315.2	400.00
2	98.63	24.09	0.922	0.50(0.23)	0.46	124.3	413.00

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	279.81	24.09	0.922	0.50(0.24)	0.48	355.7	413.00
2	279.94	31.80	0.805	0.50(0.24)	0.48	429.8	430.00
3	265.47	34.44	0.768	0.50(0.24)	0.48	439.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 279.94 Tc(MIN.) = 31.80
 EFFECTIVE AREA(ACRES) = 429.82 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 439.5
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

FLOW PROCESS FROM NODE 427.00 TO NODE 428.00 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) = 275.00
 FLOW LENGTH(FEET) = 789.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 38.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 26.03
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 279.94
 PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 32.31

LONGEST FLOWPATH FROM NODE 430.00 TO NODE 428.00 = 11352.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 439.5 TC(MIN.) = 32.31
 EFFECTIVE AREA(ACRES) = 429.82 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.477
 PEAK FLOW RATE(CFS) = 279.94

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	279.81	24.60	0.910	0.50(0.24)	0.48	355.7	413.00
2	279.94	32.31	0.798	0.50(0.24)	0.48	429.8	430.00
3	265.47	34.94	0.761	0.50(0.24)	0.48	439.5	400.00

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:

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92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA D ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 10-YR EV SEPTEMBER 2018 CCHI *

FILE NAME: PA3D10EV.DAT
TIME/DATE OF STUDY: 11:54 09/25/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 5.00
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 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) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 605.00 DOWNSTREAM(FEET) = 586.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.417
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.552

D-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.)
RESIDENTIAL						
".4 DWELLING/ACRE"	B	1.20	0.30	0.900	56	8.77
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.30	0.30	0.600	56	7.42
PUBLIC PARK	B	2.40	0.30	0.850	56	8.70

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.796
SUBAREA RUNOFF(CFS) = 10.20
TOTAL AREA(ACRES) = 4.90 PEAK FLOW RATE(CFS) = 10.20

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) = 586.00 DOWNSTREAM ELEVATION(FEET) = 583.00
STREET LENGTH(FEET) = 333.00 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) = 16.81
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.48
HALFSTREET FLOOD WIDTH(FEET) = 17.70
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.81
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.35
STREET FLOW TRAVEL TIME(MIN.) = 1.97 Tc(MIN.) = 9.39
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.235

D-2

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	0.10	0.30	0.900	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.90	0.30	0.400	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.70	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.565
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 13.20
EFFECTIVE AREA(ACRES) = 12.00 AREA-AVERAGED Fm(INCH/HR) = 0.20

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.66
TOTAL AREA (ACRES) = 12.0 PEAK FLOW RATE (CFS) = 22.00

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.51 HALFSTREET FLOOD WIDTH (FEET) = 19.73
FLOW VELOCITY (FEET/SEC.) = 3.00 DEPTH*VELOCITY (FT*FT/SEC.) = 1.54
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.00 = 663.00 FEET.

FLOW PROCESS FROM NODE 402.00 TO NODE 402.50 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 583.00 DOWNSTREAM ELEVATION (FEET) = 580.00
STREET LENGTH (FEET) = 315.00 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) = 25.99
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.53
HALFSTREET FLOOD WIDTH (FEET) = 20.82
AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.20
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.71
STREET FLOW TRAVEL TIME (MIN.) = 1.64 Tc (MIN.) = 11.03
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.042

D-3

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.80	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 7.97
EFFECTIVE AREA (ACRES) = 16.70 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.62
TOTAL AREA (ACRES) = 16.7 PEAK FLOW RATE (CFS) = 27.88

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.55 HALFSTREET FLOOD WIDTH (FEET) = 21.45
FLOW VELOCITY (FEET/SEC.) = 3.24 DEPTH*VELOCITY (FT*FT/SEC.) = 1.77
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.50 = 978.00 FEET.

FLOW PROCESS FROM NODE 402.50 TO NODE 403.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 580.00 DOWNSTREAM ELEVATION (FEET) = 579.00
STREET LENGTH (FEET) = 394.00 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) = 30.16
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.67
HALFSTREET FLOOD WIDTH (FEET) = 29.00
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.01
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.35
STREET FLOW TRAVEL TIME (MIN.) = 3.27 Tc (MIN.) = 14.31
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.764

D-3.1

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.80	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.435
SUBAREA AREA (ACRES) = 3.10 SUBAREA RUNOFF (CFS) = 4.56
EFFECTIVE AREA (ACRES) = 19.80 AREA-AVERAGED Fm (INCH/HR) = 0.18
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.59
TOTAL AREA (ACRES) = 19.8 PEAK FLOW RATE (CFS) = 28.27

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.66 HALFSTREET FLOOD WIDTH (FEET) = 27.93
FLOW VELOCITY (FEET/SEC.) = 1.97 DEPTH*VELOCITY (FT*FT/SEC.) = 1.31
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 1372.00 FEET.

FLOW PROCESS FROM NODE 403.00 TO NODE 404.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 579.00 DOWNSTREAM ELEVATION (FEET) = 560.00
STREET LENGTH (FEET) = 974.00 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) = 34.04
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.52
 HALFSTREET FLOOD WIDTH(FEET) = 20.12
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.47
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.33
 STREET FLOW TRAVEL TIME(MIN.) = 3.63 Tc(MIN.) = 17.94

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.554 **D-4**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	5.80	0.30	0.100	56
COMMERCIAL	B	0.70	0.30	0.100	56
PUBLIC PARK	B	1.10	0.30	0.850	56
PUBLIC PARK	B	0.70	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.30	0.30	0.400	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =			0.30		
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =			0.267		
SUBAREA AREA(ACRES) =		8.70	SUBAREA RUNOFF(CFS) =		11.54
EFFECTIVE AREA(ACRES) =		28.50	AREA-AVERAGED Fm(INCH/HR) =		0.15
AREA-AVERAGED Fp(INCH/HR) =		0.30	AREA-AVERAGED Ap =		0.49
TOTAL AREA(ACRES) =		28.5	PEAK FLOW RATE(CFS) =		36.06

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.59
 FLOW VELOCITY(FEET/SEC.) = 4.53 DEPTH*VELOCITY(FT*FT/SEC.) = 2.40
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 404.00 = 2346.00 FEET.

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.94
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.554 **D-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"	B	0.10	0.30	1.000	66
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.30	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.70	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.40	0.30	0.400	56

RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 5.30 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.432
 SUBAREA AREA(ACRES) = 13.90 SUBAREA RUNOFF(CFS) = 17.82
 EFFECTIVE AREA(ACRES) = 42.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 42.4 PEAK FLOW RATE(CFS) = 53.87

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.94
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.554 **D-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"	B	0.20	0.30	0.900	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =			0.30		
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =			0.900		
SUBAREA AREA(ACRES) =		0.20	SUBAREA RUNOFF(CFS) =		0.23
EFFECTIVE AREA(ACRES) =		42.60	AREA-AVERAGED Fm(INCH/HR) =		0.14
AREA-AVERAGED Fp(INCH/HR) =		0.30	AREA-AVERAGED Ap =		0.47
TOTAL AREA(ACRES) =		42.6	PEAK FLOW RATE(CFS) =		54.10

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.94
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.554 **D-6**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
PUBLIC PARK	B	1.50	0.30	0.850	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.50	0.30	0.500	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =			0.30		
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =			0.590		
SUBAREA AREA(ACRES) =		4.50	SUBAREA RUNOFF(CFS) =		5.58
EFFECTIVE AREA(ACRES) =		47.10	AREA-AVERAGED Fm(INCH/HR) =		0.15
AREA-AVERAGED Fp(INCH/HR) =		0.30	AREA-AVERAGED Ap =		0.49
TOTAL AREA(ACRES) =		47.1	PEAK FLOW RATE(CFS) =		59.68

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 17.94

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.554 **D-6**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	2.80	0.30	0.850	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	3.00	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	6.40	0.30	0.500	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	6.70	0.30	0.600	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	4.30	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	8.70	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.671

SUBAREA AREA(ACRES) = 31.90 SUBAREA RUNOFF(CFS) = 38.83

EFFECTIVE AREA(ACRES) = 79.00 AREA-AVERAGED Fm(INCH/HR) = 0.17

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.56

TOTAL AREA(ACRES) = 79.0 PEAK FLOW RATE(CFS) = 98.51

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 17.94

RAINFALL INTENSITY(INCH/HR) = 1.55

AREA-AVERAGED Fm(INCH/HR) = 0.17

AREA-AVERAGED Fp(INCH/HR) = 0.30

AREA-AVERAGED Ap = 0.56

EFFECTIVE STREAM AREA(ACRES) = 79.00

TOTAL STREAM AREA(ACRES) = 79.00

PEAK FLOW RATE(CFS) AT CONFLUENCE = 98.51

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) = 729.00 DOWNSTREAM(FEET) = 630.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.120

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.272 **OD-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"	B	0.10	0.30	1.000	72	9.12

NATURAL FAIR COVER

"OPEN BRUSH"	B	1.30	0.30	1.000	66	9.12
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NATURAL FAIR COVER

"OPEN BRUSH"	B	0.10	0.30	1.000	66	9.12
--------------	---	------	------	-------	----	------

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF(CFS) = 2.66

TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 2.66

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

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.198 **OD-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"	B	1.70	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	0.10	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.10	0.30	1.000	66

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.28

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.88

AVERAGE FLOW DEPTH(FEET) = 0.49 TRAVEL TIME(MIN.) = 0.56

Tc(MIN.) = 9.68

SUBAREA AREA(ACRES) = 1.90 SUBAREA RUNOFF(CFS) = 3.25

EFFECTIVE AREA(ACRES) = 3.40 AREA-AVERAGED Fm(INCH/HR) = 0.30

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 3.4 PEAK FLOW RATE(CFS) = 5.81

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.55 FLOW VELOCITY(FEET/SEC.) = 6.31

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) = 570.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 243.00 CHANNEL SLOPE = 0.1111

CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000

MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.117

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"	B	0.10	0.30	1.000	72

RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
NATURAL FAIR COVER
"OPEN BRUSH" B 3.80 0.30 1.000 66
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.30 0.30 1.000 65
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 0.10 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 0.20 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.49
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.07
AVERAGE FLOW DEPTH(FEET) = 0.72 TRAVEL TIME(MIN.) = 0.67
Tc(MIN.) = 10.34
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 7.36
EFFECTIVE AREA(ACRES) = 7.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 7.9 PEAK FLOW RATE(CFS) = 12.92

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.81 FLOW VELOCITY(FEET/SEC.) = 6.54
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.00 = 768.00 FEET.

FLOW PROCESS FROM NODE 433.00 TO NODE 433.10 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) = 564.00
FLOW LENGTH(FEET) = 1076.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.67
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.92
PIPE TRAVEL TIME(MIN.) = 3.16 Tc(MIN.) = 13.50
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.10 = 1844.00 FEET.

FLOW PROCESS FROM NODE 433.10 TO NODE 433.10 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

MAINLINE Tc(MIN.) = 13.50
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.822

D-8

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.70	0.30	0.900	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	5.40	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.613
SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 11.21

EFFECTIVE AREA(ACRES) = 15.50 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.81
TOTAL AREA(ACRES) = 15.5 PEAK FLOW RATE(CFS) = 22.04

FLOW PROCESS FROM NODE 433.10 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) = 564.00 DOWNSTREAM(FEET) = 560.00
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.13
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 22.04
PIPE TRAVEL TIME(MIN.) = 2.25 Tc(MIN.) = 15.76
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.76
RAINFALL INTENSITY(INCH/HR) = 1.67
AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.81
EFFECTIVE STREAM AREA(ACRES) = 15.50
TOTAL STREAM AREA(ACRES) = 15.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 22.04

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	98.51	17.94	1.554	0.30(0.17)	0.56	79.0	400.00
2	22.04	15.76	1.671	0.30(0.24)	0.81	15.5	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	115.90	15.76	1.671	0.30(0.18)	0.61	84.9	430.00
2	118.73	17.94	1.554	0.30(0.18)	0.60	94.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 118.73 Tc(MIN.) = 17.94
EFFECTIVE AREA(ACRES) = 94.50 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 94.5
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

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*****
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) = 560.00 DOWNSTREAM(FEET) = 557.00
FLOW LENGTH(FEET) = 377.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 38.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.02
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 118.73
PIPE TRAVEL TIME(MIN.) = 0.57 Tc(MIN.) = 18.51
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 405.00 = 3051.00 FEET.

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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 18.51
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.527 D-9
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL           B       1.30    0.30   0.100  56
PUBLIC PARK          B       0.90    0.30   0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B       0.20    0.30   0.200  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B       4.50    0.30   0.500  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B       3.20    0.30   0.400  56
COMMERCIAL           B       1.20    0.30   0.100  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.406
SUBAREA AREA(ACRES) = 11.30 SUBAREA RUNOFF(CFS) = 14.29
EFFECTIVE AREA(ACRES) = 105.80 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 105.8 PEAK FLOW RATE(CFS) = 128.78

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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 18.51
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.527 D-9
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK          B       0.20    0.30   0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B       0.10    0.30   0.200  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B       4.20    0.30   0.500  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B       3.80    0.30   0.400  56

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.459
SUBAREA AREA(ACRES) = 8.30 SUBAREA RUNOFF(CFS) = 10.37
EFFECTIVE AREA(ACRES) = 114.10 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.57
TOTAL AREA(ACRES) = 114.1 PEAK FLOW RATE(CFS) = 139.15

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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.51
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.527 D-7
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       4.80    0.30   0.200  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B       0.10    0.30   0.600  56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B       5.20    0.30   0.400  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.307
SUBAREA AREA(ACRES) = 10.10 SUBAREA RUNOFF(CFS) = 13.04
EFFECTIVE AREA(ACRES) = 124.20 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 124.2 PEAK FLOW RATE(CFS) = 152.19

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FLOW PROCESS FROM NODE 405.00 TO NODE 406.00 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) = 557.00 DOWNSTREAM(FEET) = 535.00
FLOW LENGTH(FEET) = 525.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.99
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 152.19
PIPE TRAVEL TIME(MIN.) = 0.40 Tc(MIN.) = 18.91
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 406.00 = 3576.00 FEET.

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FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.91
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.508 D-10
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" B       0.30    0.30   0.900  56
PUBLIC PARK          B       0.90    0.30   0.850  56

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RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 8.70 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
 PUBLIC PARK B 0.40 0.30 0.850 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.311
 SUBAREA AREA(ACRES) = 10.50 SUBAREA RUNOFF(CFS) = 13.37
 EFFECTIVE AREA(ACRES) = 134.70 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 134.7 PEAK FLOW RATE(CFS) = 163.54

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	164.06	16.73	1.616	0.30(0.16)	0.53	125.1	430.00
2	163.54	18.91	1.508	0.30(0.16)	0.53	134.7	400.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 164.06 Tc(MIN.) = 16.73
 AREA-AVERAGED Fm(INCH/HR) = 0.16 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.53 EFFECTIVE AREA(ACRES) = 125.10

 FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.73

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.616

D-10

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	9.00	0.30	0.200	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200					
SUBAREA AREA(ACRES) = 9.00 SUBAREA RUNOFF(CFS) = 12.60					
EFFECTIVE AREA(ACRES) = 134.10 AREA-AVERAGED Fm(INCH/HR) = 0.15					
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51					
TOTAL AREA(ACRES) = 143.7 PEAK FLOW RATE(CFS) = 176.66					

 FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.73

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.616

D-11

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	0.30	0.30	0.600	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56
RESIDENTIAL					

"3-4 DWELLINGS/ACRE" B 18.70 0.30 0.600 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 1.00 0.30 0.600 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.609
 SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 26.57
 EFFECTIVE AREA(ACRES) = 154.70 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 164.3 PEAK FLOW RATE(CFS) = 203.24

 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) = 535.00 DOWNSTREAM(FEET) = 510.00
 FLOW LENGTH(FEET) = 311.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 29.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 30.36
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 203.24
 PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 16.90
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 407.00 = 3887.00 FEET.

 FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.90

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.607

D-11.1

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"	B	0.10	0.30	0.500	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.10	0.30	0.900	56
COMMERCIAL	B	2.20	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
COMMERCIAL	B	1.10	0.30	0.100	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.353					
SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 6.62					
EFFECTIVE AREA(ACRES) = 159.60 AREA-AVERAGED Fm(INCH/HR) = 0.15					
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52					
TOTAL AREA(ACRES) = 169.2 PEAK FLOW RATE(CFS) = 208.57					

 FLOW PROCESS FROM NODE 407.00 TO NODE 408.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 510.00 DOWNSTREAM(FEET) = 480.00
 FLOW LENGTH(FEET) = 624.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 34.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 24.80
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 208.57
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 17.32
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 408.00 = 4511.00 FEET.

 FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.32 **D-12**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.585
 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	0.70	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.60	0.30	0.600	56
COMMERCIAL	B	1.40	0.30	0.100	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	4.80	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.20	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.20	0.30	0.500	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.649
 SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 18.64
 EFFECTIVE AREA(ACRES) = 174.50 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 184.1 PEAK FLOW RATE(CFS) = 224.06

 FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.32 **D-12**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.585
 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
RESIDENTIAL					
"4 DWELLING/ACRE"	B	2.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	6.60	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.00	0.30	0.500	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.625
 SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 13.83
 EFFECTIVE AREA(ACRES) = 185.50 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 195.1 PEAK FLOW RATE(CFS) = 237.89

 FLOW PROCESS FROM NODE 408.00 TO NODE 409.00 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) = 460.00
 FLOW LENGTH(FEET) = 368.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 33.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 27.36
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 237.89
 PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 17.54
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 409.00 = 4879.00 FEET.

 FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.54 **D-13**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.573
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.70	0.30	0.850	56
RESIDENTIAL					
"4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.20	0.30	0.600	56
APARTMENTS	B	0.20	0.30	0.200	56
COMMERCIAL	B	0.60	0.30	0.100	56
PUBLIC PARK	B	1.80	0.30	0.850	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.658
 SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 7.18
 EFFECTIVE AREA(ACRES) = 191.30 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 200.9 PEAK FLOW RATE(CFS) = 243.16

 FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.54 **D-13**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.573
 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	1.20	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.90	0.30	0.600	56
RESIDENTIAL					

"5-7 DWELLINGS/ACRE" B 3.30 0.30 0.500 56
 APARTMENTS B 0.10 0.30 0.200 56
 COMMERCIAL B 0.40 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.20 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.616
 SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 11.37
 EFFECTIVE AREA(ACRES) = 200.40 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 210.0 PEAK FLOW RATE(CFS) = 254.53

 FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 17.54
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.573
 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" B 3.80 0.30 0.600 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 2.00 0.30 0.500 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566
 SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 7.33
 EFFECTIVE AREA(ACRES) = 206.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 215.8 PEAK FLOW RATE(CFS) = 261.86

D-13

 FLOW PROCESS FROM NODE 409.00 TO NODE 410.00 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) = 445.00
 FLOW LENGTH(FEET) = 291.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 33.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 27.62
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 261.86
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 17.72
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 410.00 = 5170.00 FEET.

 FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 17.72
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.565
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

PUBLIC PARK B 0.90 0.30 0.850 56
 APARTMENTS B 1.50 0.30 0.200 56
 COMMERCIAL B 0.80 0.30 0.100 56
 PUBLIC PARK B 2.30 0.30 0.850 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 1.40 0.30 0.600 56
 APARTMENTS B 3.10 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456
 SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 12.85
 EFFECTIVE AREA(ACRES) = 216.20 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 225.8 PEAK FLOW RATE(CFS) = 273.08

D-14

 FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 17.72
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.565
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 1.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.00 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.645
 SUBAREA AREA(ACRES) = 5.20 SUBAREA RUNOFF(CFS) = 6.42
 EFFECTIVE AREA(ACRES) = 221.40 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA(ACRES) = 231.0 PEAK FLOW RATE(CFS) = 279.50

D-14

 FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 17.72
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.565
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 APARTMENTS B 2.10 0.30 0.200 56
 APARTMENTS B 8.90 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 14.89
 EFFECTIVE AREA(ACRES) = 232.40 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 242.0 PEAK FLOW RATE(CFS) = 294.39

D-14.1

 FLOW PROCESS FROM NODE 410.00 TO NODE 411.00 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) = 445.00 DOWNSTREAM(FEET) = 425.00
FLOW LENGTH(FEET) = 324.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.35
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 294.39
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 17.89
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 411.00 = 5494.00 FEET.

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FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.89
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.556
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS          B         0.10   0.30  0.200  56
COMMERCIAL          B         0.20   0.30  0.100  56
PUBLIC PARK         B         1.70   0.30  0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B         0.70   0.30  0.200  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B         0.20   0.30  0.600  56
COMMERCIAL          B         0.70   0.30  0.100  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.504
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 4.55
EFFECTIVE AREA(ACRES) = 236.00 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 245.6 PEAK FLOW RATE(CFS) = 297.11

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FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.89
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.556
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK         B         0.90   0.30  0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B         8.80   0.30  0.200  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B         0.20   0.30  0.600  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.267
SUBAREA AREA(ACRES) = 9.90 SUBAREA RUNOFF(CFS) = 13.15
EFFECTIVE AREA(ACRES) = 245.90 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 255.5 PEAK FLOW RATE(CFS) = 310.26

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FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.89
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.556
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS          B         0.50   0.30  0.200  56
RESIDENTIAL
".4 DWELLING/ACRE" B         0.10   0.30  0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B         2.10   0.30  0.600  56
APARTMENTS          B         0.70   0.30  0.200  56
RESIDENTIAL
".4 DWELLING/ACRE" B         0.10   0.30  0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B         4.30   0.30  0.600  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.546
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 9.77
EFFECTIVE AREA(ACRES) = 253.70 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 263.3 PEAK FLOW RATE(CFS) = 320.03

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FLOW PROCESS FROM NODE 411.00 TO NODE 412.00 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) = 425.00 DOWNSTREAM(FEET) = 392.00
FLOW LENGTH(FEET) = 641.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.91
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 320.03
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 18.26
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 412.00 = 6135.00 FEET.

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FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.26
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.538
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
RESIDENTIAL
"11+ DWELLINGS/ACRE" B         5.30   0.30  0.200  56
RESIDENTIAL
".4 DWELLING/ACRE" B         0.10   0.30  0.900  56

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COMMERCIAL B 1.10 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 7.30 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.198
 SUBAREA AREA(ACRES) = 14.50 SUBAREA RUNOFF(CFS) = 19.30
 EFFECTIVE AREA(ACRES) = 268.20 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 277.8 PEAK FLOW RATE(CFS) = 335.27

 FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

 MAINLINE Tc(MIN.) = 18.26
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.538 **D-32**
 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	0.20	0.30	0.200	56
COMMERCIAL	B	0.20	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	4.10	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.10	0.30	0.400	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.50	0.30	0.200	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.317
 SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 11.30
 EFFECTIVE AREA(ACRES) = 276.90 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 286.5 PEAK FLOW RATE(CFS) = 346.56

 FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

 MAINLINE Tc(MIN.) = 18.26
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.538 **D-32**
 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	0.50	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.00	0.30	0.400	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456
 SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 5.68
 EFFECTIVE AREA(ACRES) = 281.40 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 291.0 PEAK FLOW RATE(CFS) = 352.24

 FLOW PROCESS FROM NODE 412.00 TO NODE 420.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 392.00 DOWNSTREAM(FEET) = 350.00
 FLOW LENGTH(FEET) = 1358.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 24.29
 ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 352.24
 PIPE TRAVEL TIME(MIN.) = 0.93 Tc(MIN.) = 19.20
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 420.00 = 7493.00 FEET.

 FLOW PROCESS FROM NODE 420.00 TO NODE 420.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

 MAINLINE Tc(MIN.) = 19.20
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.496 **D-35**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.50	0.30	0.100	56
COMMERCIAL	B	1.30	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.105
 SUBAREA AREA(ACRES) = 1.90 SUBAREA RUNOFF(CFS) = 2.50
 EFFECTIVE AREA(ACRES) = 283.30 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 292.9 PEAK FLOW RATE(CFS) = 352.24
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 FLOW PROCESS FROM NODE 420.00 TO NODE 421.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 346.00 DOWNSTREAM(FEET) = 320.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1617.00 CHANNEL SLOPE = 0.0161
 CHANNEL BASE(FEET) = 200.00 "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 20.00

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.254 **D-34**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	6.90	0.30	0.100	56
COMMERCIAL	B	3.60	0.30	0.100	56
COMMERCIAL	B	2.20	0.30	0.100	56
RESIDENTIAL					

" .4 DWELLING/ACRE" B 0.70 0.30 0.900 56
 RESIDENTIAL
 " .4 DWELLING/ACRE" B 0.40 0.30 0.900 56
 RESIDENTIAL
 " .4 DWELLING/ACRE" B 1.30 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.227
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 360.28
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.80
 AVERAGE FLOW DEPTH(FEET) = 0.47 TRAVEL TIME(MIN.) = 7.08
 Tc(MIN.) = 26.28
 SUBAREA AREA(ACRES) = 15.10 SUBAREA RUNOFF(CFS) = 16.11
 EFFECTIVE AREA(ACRES) = 298.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
 TOTAL AREA(ACRES) = 308.0 PEAK FLOW RATE(CFS) = 352.24
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.47 FLOW VELOCITY(FEET/SEC.) = 3.73
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 421.00 = 9110.00 FEET.

 FLOW PROCESS FROM NODE 421.00 TO NODE 421.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 26.28
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.254
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 1.10 0.30 0.850 56
 PUBLIC PARK B 2.50 0.30 0.850 56
 PUBLIC PARK B 3.60 0.30 0.850 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
 SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 6.47
 EFFECTIVE AREA(ACRES) = 305.60 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 315.2 PEAK FLOW RATE(CFS) = 352.24
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

D-34

 FLOW PROCESS FROM NODE 421.00 TO NODE 427.00 IS CODE = 31

>>>>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) = 1453.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 75.0 INCH PIPE IS 58.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.78
 ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 352.24
 PIPE TRAVEL TIME(MIN.) = 1.76 Tc(MIN.) = 28.04
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 28.04
 RAINFALL INTENSITY(INCH/HR) = 1.21
 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.48
 EFFECTIVE STREAM AREA(ACRES) = 305.60
 TOTAL STREAM AREA(ACRES) = 315.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 352.24

 FLOW PROCESS FROM NODE 413.00 TO NODE 414.00 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) = 515.00 DOWNSTREAM(FEET) = 497.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.533
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 3.009
 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 B 0.10 0.30 0.100 56 5.53
 PUBLIC PARK B 1.10 0.30 0.850 56 8.79
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56 7.50
 COMMERCIAL B 0.10 0.30 0.100 56 5.53
 PUBLIC PARK B 0.30 0.30 0.850 56 8.79
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 1.50 0.30 0.600 56 7.50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.678
 SUBAREA RUNOFF(CFS) = 8.08
 TOTAL AREA(ACRES) = 3.20 PEAK FLOW RATE(CFS) = 8.08

D-21

 FLOW PROCESS FROM NODE 414.00 TO NODE 414.10 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>(STREET TABLE SECTION # 1 USED) <<<<<

 UPSTREAM ELEVATION(FEET) = 497.00 DOWNSTREAM ELEVATION(FEET) = 493.00
 STREET LENGTH(FEET) = 371.00 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-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 13.05
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.35
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.84
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.24
STREET FLOW TRAVEL TIME(MIN.) = 2.18 Tc(MIN.) = 7.71
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.497

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 1.40 0.30 0.850 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.40 0.30 0.600 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 2.00 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.673
SUBAREA AREA(ACRES) = 4.80 SUBAREA RUNOFF(CFS) = 9.92
EFFECTIVE AREA(ACRES) = 8.00 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.68
TOTAL AREA(ACRES) = 8.0 PEAK FLOW RATE(CFS) = 16.52

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 16.91
FLOW VELOCITY(FEET/SEC.) = 3.01 DEPTH*VELOCITY(FT*FT/SEC.) = 1.40
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.10 = 701.00 FEET.

FLOW PROCESS FROM NODE 414.10 TO NODE 414.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 493.00 DOWNSTREAM ELEVATION(FEET) = 490.00
STREET LENGTH(FEET) = 476.00 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-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.36
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.54
HALFSTREET FLOOD WIDTH(FEET) = 20.90
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.40
STREET FLOW TRAVEL TIME(MIN.) = 3.04 Tc(MIN.) = 10.75

D-22

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.072 D-23

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 0.50 0.30 0.100 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.40 0.30 0.600 56
COMMERCIAL B 0.40 0.30 0.100 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.20 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.512
SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 9.67
EFFECTIVE AREA(ACRES) = 13.60 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.61
TOTAL AREA(ACRES) = 13.6 PEAK FLOW RATE(CFS) = 23.12

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.55 HALFSTREET FLOOD WIDTH(FEET) = 21.60
FLOW VELOCITY(FEET/SEC.) = 2.65 DEPTH*VELOCITY(FT*FT/SEC.) = 1.45
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.20 = 1177.00 FEET.

FLOW PROCESS FROM NODE 414.20 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) = 490.00 DOWNSTREAM(FEET) = 465.00
FLOW LENGTH(FEET) = 488.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.21
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 23.12
PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 11.29
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 415.00 = 1665.00 FEET.

FLOW PROCESS FROM NODE 415.00 TO NODE 415.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 11.29
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.016 D-24
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" B 0.10 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 2.30 0.30 0.600 56
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 0.80 0.30 0.100 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.20 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.537

SUBAREA AREA (ACRES) = 6.50 SUBAREA RUNOFF (CFS) = 10.85
EFFECTIVE AREA (ACRES) = 20.10 AREA-AVERAGED Fm (INCH/HR) = 0.18
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.59
TOTAL AREA (ACRES) = 20.1 PEAK FLOW RATE (CFS) = 33.29

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) = 465.00 DOWNSTREAM(FEET) = 440.00
FLOW LENGTH(FEET) = 497.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 17.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 15.98
ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 33.29
PIPE TRAVEL TIME (MIN.) = 0.52 Tc (MIN.) = 11.80
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 416.00 = 2162.00 FEET.

FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 11.80
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.966

D-26

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.80	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.70	0.30	0.400	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.392					
SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 8.15					
EFFECTIVE AREA (ACRES) = 25.00 AREA-AVERAGED Fm (INCH/HR) = 0.16					
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55					
TOTAL AREA (ACRES) = 25.0 PEAK FLOW RATE (CFS) = 40.53					

FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 11.80
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.966

D-25

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	1.80	0.30	0.200	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.60	0.30	0.600	56

RESIDENTIAL
"11+ DWELLINGS/ACRE" B 3.60 0.30 0.200 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.00 0.30 0.600 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.389
SUBAREA AREA (ACRES) = 10.10 SUBAREA RUNOFF (CFS) = 16.81
EFFECTIVE AREA (ACRES) = 35.10 AREA-AVERAGED Fm (INCH/HR) = 0.15
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA (ACRES) = 35.1 PEAK FLOW RATE (CFS) = 57.34

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) = 440.00 DOWNSTREAM(FEET) = 420.00
FLOW LENGTH(FEET) = 437.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.3 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 17.92
ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 57.34
PIPE TRAVEL TIME (MIN.) = 0.41 Tc (MIN.) = 12.21
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 417.00 = 2599.00 FEET.

FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 12.21
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.929

D-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"	B	1.50	0.30	0.200	56
COMMERCIAL	B	0.70	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.40	0.30	0.200	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.188					
SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 9.44					
EFFECTIVE AREA (ACRES) = 40.70 AREA-AVERAGED Fm (INCH/HR) = 0.14					
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46					
TOTAL AREA (ACRES) = 40.7 PEAK FLOW RATE (CFS) = 65.60					

FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 12.21
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.929

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	1.50	0.30	0.200	56
COMMERCIAL	B	0.70	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.40	0.30	0.200	56

COMMERCIAL B 4.60 0.30 0.100 56 **D-28**
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 4.00 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
 COMMERCIAL B 1.50 0.30 0.100 56
 PUBLIC PARK B 2.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 1.60 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.264
 SUBAREA AREA(ACRES) = 14.00 SUBAREA RUNOFF(CFS) = 23.30
 EFFECTIVE AREA(ACRES) = 54.70 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 54.7 PEAK FLOW RATE(CFS) = 88.90

 FLOW PROCESS FROM NODE 417.00 TO NODE 418.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 420.00 DOWNSTREAM(FEET) = 400.00
 FLOW LENGTH(FEET) = 619.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 26.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.31
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 88.90
 PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 12.81
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 418.00 = 3218.00 FEET.

 FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 12.81
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.878 **D-30**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 0.70 0.30 0.100 56
 COMMERCIAL B 2.10 0.30 0.100 56
 COMMERCIAL B 3.90 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 5.50 0.30 0.500 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 3.20 0.30 0.500 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.333
 SUBAREA AREA(ACRES) = 15.60 SUBAREA RUNOFF(CFS) = 24.96
 EFFECTIVE AREA(ACRES) = 70.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 70.3 PEAK FLOW RATE(CFS) = 111.35

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 12.81 **D-30**
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.878
 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" B 0.30 0.30 0.500 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.40 0.30 0.400 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 3.10 0.30 0.400 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
 SUBAREA AREA(ACRES) = 4.00 SUBAREA RUNOFF(CFS) = 6.32
 EFFECTIVE AREA(ACRES) = 74.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
 TOTAL AREA(ACRES) = 74.3 PEAK FLOW RATE(CFS) = 117.67

 FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 12.81
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.878 **D-29**
 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
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 2.20 0.30 0.200 56
 COMMERCIAL B 3.70 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 3.50 0.30 0.200 56
 COMMERCIAL B 0.70 0.30 0.100 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.154
 SUBAREA AREA(ACRES) = 10.80 SUBAREA RUNOFF(CFS) = 17.80
 EFFECTIVE AREA(ACRES) = 85.10 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
 TOTAL AREA(ACRES) = 85.1 PEAK FLOW RATE(CFS) = 135.47

 FLOW PROCESS FROM NODE 418.00 TO NODE 425.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 320.00
 FLOW LENGTH(FEET) = 1179.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.9 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 26.03
 ESTIMATED PIPE DIAMETER (INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 135.47
 PIPE TRAVEL TIME (MIN.) = 0.75 Tc (MIN.) = 13.56
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 425.00 = 4397.00 FEET.

FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 13.56
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.818 **D-33**

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	B	0.40	0.30	0.100	56
COMMERCIAL	B	0.90	0.30	0.100	56
PUBLIC PARK	B	5.30	0.30	0.850	56
PUBLIC PARK	B	3.10	0.30	0.850	56
PUBLIC PARK	B	9.10	0.30	0.850	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.777
 SUBAREA AREA (ACRES) = 19.40 SUBAREA RUNOFF (CFS) = 27.68
 EFFECTIVE AREA (ACRES) = 104.50 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
 TOTAL AREA (ACRES) = 104.5 PEAK FLOW RATE (CFS) = 158.59

FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 13.56
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.818 **D-33**

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	1.30	0.30	0.900	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.90	0.30	0.900	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.90	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA (ACRES) = 5.10 SUBAREA RUNOFF (CFS) = 7.11
 EFFECTIVE AREA (ACRES) = 109.60 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 109.6 PEAK FLOW RATE (CFS) = 165.70

FLOW PROCESS FROM NODE 425.00 TO NODE 426.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<

=====

ELEVATION DATA: UPSTREAM (FEET) = 320.00 DOWNSTREAM (FEET) = 316.00
 CHANNEL LENGTH THRU SUBAREA (FEET) = 870.00 CHANNEL SLOPE = 0.0046
 GIVEN CHANNEL BASE (FEET) = 200.00 CHANNEL FREEBOARD (FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT (FEET) = 1.45
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.421 **D-36**
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.40	0.30	0.100	56
COMMERCIAL	B	3.30	0.30	0.100	56
PUBLIC PARK	B	0.80	0.30	0.850	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.90	0.30	0.900	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	2.30	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.408
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 172.13
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 1.94
 AVERAGE FLOW DEPTH (FEET) = 0.44 TRAVEL TIME (MIN.) = 7.46
 Tc (MIN.) = 21.02
 SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF (CFS) = 12.86
 EFFECTIVE AREA (ACRES) = 120.60 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 120.6 PEAK FLOW RATE (CFS) = 165.70
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
 GIVEN CHANNEL BASE (FEET) = 200.00 CHANNEL FREEBOARD (FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT (FEET) = 1.43

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.43 FLOW VELOCITY (FEET/SEC.) = 1.91
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 426.00 = 5267.00 FEET.

FLOW PROCESS FROM NODE 426.00 TO NODE 426.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 21.02
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.421 **D-37**

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
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.70	0.30	0.900	56
PUBLIC PARK	B	0.50	0.30	0.850	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.569
 SUBAREA AREA (ACRES) = 3.70 SUBAREA RUNOFF (CFS) = 4.16
 EFFECTIVE AREA (ACRES) = 124.30 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA (ACRES) = 124.3 PEAK FLOW RATE (CFS) = 165.70
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 426.00 TO NODE 427.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 316.00 DOWNSTREAM(FEET) = 310.00

FLOW LENGTH(FEET) = 321.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.3 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 16.75

ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 165.70

PIPE TRAVEL TIME(MIN.) = 0.32 Tc(MIN.) = 21.34

LONGEST FLOWPATH FROM NODE 413.00 TO NODE 427.00 = 5588.00 FEET.

FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 21.34

RAINFALL INTENSITY(INCH/HR) = 1.41

AREA-AVERAGED Fm(INCH/HR) = 0.14

AREA-AVERAGED Fp(INCH/HR) = 0.30

AREA-AVERAGED Ap = 0.46

EFFECTIVE STREAM AREA(ACRES) = 124.30

TOTAL STREAM AREA(ACRES) = 124.30

PEAK FLOW RATE(CFS) AT CONFLUENCE = 165.70

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	352.24	28.04	1.209	0.30(0.15)	0.48	305.6	430.00
1	339.11	30.37	1.156	0.30(0.15)	0.49	315.2	400.00
2	165.70	21.34	1.409	0.30(0.14)	0.46	124.3	413.00

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	484.30	21.34	1.409	0.30(0.14)	0.48	356.9	413.00
2	491.81	28.04	1.209	0.30(0.14)	0.48	429.9	430.00
3	471.75	30.37	1.156	0.30(0.14)	0.48	439.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 491.81 Tc(MIN.) = 28.04

EFFECTIVE AREA(ACRES) = 429.90 AREA-AVERAGED Fm(INCH/HR) = 0.14

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48

TOTAL AREA(ACRES) = 439.5

LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

FLOW PROCESS FROM NODE 427.00 TO NODE 428.00 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) = 275.00

FLOW LENGTH(FEET) = 789.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 60.0 INCH PIPE IS 46.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 30.15

ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 491.81

PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 28.47

LONGEST FLOWPATH FROM NODE 430.00 TO NODE 428.00 = 11352.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 439.5 TC(MIN.) = 28.47

EFFECTIVE AREA(ACRES) = 429.90 AREA-AVERAGED Fm(INCH/HR) = 0.14

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.477

PEAK FLOW RATE(CFS) = 491.81

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	484.30	21.77	1.393	0.30(0.14)	0.48	356.9	413.00
2	491.81	28.47	1.198	0.30(0.14)	0.48	429.9	430.00
3	471.75	30.81	1.146	0.30(0.14)	0.48	439.5	400.00

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Analysis prepared by:

Michael Baker International
5 Hutton Center Drive, Suite 500
Santa Ana, CA
92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA D ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 25-YR EV SEPTEMBER 2018 CCHI *

FILE NAME: PA3D25EV.DAT
TIME/DATE OF STUDY: 11:53 09/25/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
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) (FT)	MANNING HIKE (FT) (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 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) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 605.00 DOWNSTREAM(FEET) = 586.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.417
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.238

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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"	B	1.20	0.30	0.900	56	8.77
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.30	0.30	0.600	56	7.42
PUBLIC PARK	B	2.40	0.30	0.850	56	8.70

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.796
SUBAREA RUNOFF(CFS) = 13.23
TOTAL AREA(ACRES) = 4.90 PEAK FLOW RATE(CFS) = 13.23

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) = 586.00 DOWNSTREAM ELEVATION(FEET) = 583.00
STREET LENGTH(FEET) = 333.00 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) = 21.81
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.51
HALFSTREET FLOOD WIDTH(FEET) = 19.65
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.99
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.54
STREET FLOW TRAVEL TIME(MIN.) = 1.85 Tc(MIN.) = 9.27
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.850

D-2

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	0.10	0.30	0.900	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.90	0.30	0.400	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.70	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.565
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 17.13
EFFECTIVE AREA(ACRES) = 12.00 AREA-AVERAGED Fm(INCH/HR) = 0.20

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.66
TOTAL AREA (ACRES) = 12.0 PEAK FLOW RATE (CFS) = 28.64

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.55 HALFSTREET FLOOD WIDTH (FEET) = 21.91
FLOW VELOCITY (FEET/SEC.) = 3.20 DEPTH*VELOCITY (FT*FT/SEC.) = 1.77
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.00 = 663.00 FEET.

FLOW PROCESS FROM NODE 402.00 TO NODE 402.50 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 583.00 DOWNSTREAM ELEVATION (FEET) = 580.00
STREET LENGTH (FEET) = 315.00 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) = 33.83

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.57
HALFSTREET FLOOD WIDTH (FEET) = 23.09
AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.41
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.96
STREET FLOW TRAVEL TIME (MIN.) = 1.54 Tc (MIN.) = 10.81
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.610

D-3

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.80	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 10.37
EFFECTIVE AREA (ACRES) = 16.70 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.62
TOTAL AREA (ACRES) = 16.7 PEAK FLOW RATE (CFS) = 36.42

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.59 HALFSTREET FLOOD WIDTH (FEET) = 23.79
FLOW VELOCITY (FEET/SEC.) = 3.47 DEPTH*VELOCITY (FT*FT/SEC.) = 2.04
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.50 = 978.00 FEET.

FLOW PROCESS FROM NODE 402.50 TO NODE 403.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 580.00 DOWNSTREAM ELEVATION (FEET) = 579.00
STREET LENGTH (FEET) = 394.00 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) = 39.41

STREET FLOWING FULL

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.72
HALFSTREET FLOOD WIDTH (FEET) = 32.77
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.18
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.58
STREET FLOW TRAVEL TIME (MIN.) = 3.01 Tc (MIN.) = 13.82
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.268

D-3.1

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.80	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.435
SUBAREA AREA (ACRES) = 3.10 SUBAREA RUNOFF (CFS) = 5.96
EFFECTIVE AREA (ACRES) = 19.80 AREA-AVERAGED Fm (INCH/HR) = 0.18
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.59
TOTAL AREA (ACRES) = 19.8 PEAK FLOW RATE (CFS) = 37.24

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.71 HALFSTREET FLOOD WIDTH (FEET) = 32.29
FLOW VELOCITY (FEET/SEC.) = 2.14 DEPTH*VELOCITY (FT*FT/SEC.) = 1.52
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 1372.00 FEET.

FLOW PROCESS FROM NODE 403.00 TO NODE 404.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 579.00 DOWNSTREAM ELEVATION (FEET) = 560.00
STREET LENGTH (FEET) = 974.00 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) = 44.76
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.56
 HALFSTREET FLOOD WIDTH(FEET) = 22.38
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.79
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.70
 STREET FLOW TRAVEL TIME(MIN.) = 3.39 Tc(MIN.) = 17.20
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.000

D-4

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	5.80	0.30	0.100	56
COMMERCIAL	B	0.70	0.30	0.100	56
PUBLIC PARK	B	1.10	0.30	0.850	56
PUBLIC PARK	B	0.70	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.267
 SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 15.03
 EFFECTIVE AREA(ACRES) = 28.50 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 28.5 PEAK FLOW RATE(CFS) = 47.50

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 22.93
 FLOW VELOCITY(FEET/SEC.) = 4.86 DEPTH*VELOCITY(FT*FT/SEC.) = 2.78
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 404.00 = 2346.00 FEET.

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.20
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.000
 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
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.30	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.70	0.30	0.500	56
RESIDENTIAL					

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"8-10 DWELLINGS/ACRE"	B	3.40	0.30	0.400	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.30	0.30	0.200	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.432					
SUBAREA AREA(ACRES) = 13.90			SUBAREA RUNOFF(CFS) = 23.40		
EFFECTIVE AREA(ACRES) = 42.40			AREA-AVERAGED Fm(INCH/HR) = 0.14		
AREA-AVERAGED Fp(INCH/HR) = 0.30			AREA-AVERAGED Ap = 0.47		
TOTAL AREA(ACRES) = 42.4			PEAK FLOW RATE(CFS) = 70.90		

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.20
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.000
 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	0.20	0.30	0.900	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900					
SUBAREA AREA(ACRES) = 0.20			SUBAREA RUNOFF(CFS) = 0.31		
EFFECTIVE AREA(ACRES) = 42.60			AREA-AVERAGED Fm(INCH/HR) = 0.14		
AREA-AVERAGED Fp(INCH/HR) = 0.30			AREA-AVERAGED Ap = 0.47		
TOTAL AREA(ACRES) = 42.6			PEAK FLOW RATE(CFS) = 71.21		

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 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 17.20
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.000
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
PUBLIC PARK	B	1.50	0.30	0.850	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.50	0.30	0.500	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.590					
SUBAREA AREA(ACRES) = 4.50			SUBAREA RUNOFF(CFS) = 7.38		
EFFECTIVE AREA(ACRES) = 47.10			AREA-AVERAGED Fm(INCH/HR) = 0.15		
AREA-AVERAGED Fp(INCH/HR) = 0.30			AREA-AVERAGED Ap = 0.49		
TOTAL AREA(ACRES) = 47.1			PEAK FLOW RATE(CFS) = 78.60		

D-6

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

=====
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

MAINLINE Tc(MIN.) = 17.20
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.000
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	2.80	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	3.00	0.30	0.900	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	6.40	0.30	0.500	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	6.70	0.30	0.600	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	4.30	0.30	0.900	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	8.70	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.671
SUBAREA AREA(ACRES) = 31.90 SUBAREA RUNOFF(CFS) = 51.64
EFFECTIVE AREA(ACRES) = 79.00 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.56
TOTAL AREA(ACRES) = 79.0 PEAK FLOW RATE(CFS) = 130.24

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FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 17.20
RAINFALL INTENSITY(INCH/HR) = 2.00
AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.56
EFFECTIVE STREAM AREA(ACRES) = 79.00
TOTAL STREAM AREA(ACRES) = 79.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 130.24

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) = 729.00 DOWNSTREAM(FEET) = 630.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.120
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.877
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						

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"CHAPARRAL,NARROWLEAF" B 0.10 0.30 1.000 72 9.12
NATURAL FAIR COVER
"OPEN BRUSH" B 1.30 0.30 1.000 66 9.12
NATURAL FAIR COVER
"OPEN BRUSH" B 0.10 0.30 1.000 66 9.12
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 3.48
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 3.48

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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.786

OD-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"	B	1.70	0.30	1.000	66
NATURAL FAIR COVER "CHAPARRAL,NARROWLEAF"	B	0.10	0.30	1.000	72
NATURAL FAIR COVER "OPEN BRUSH"	B	0.10	0.30	1.000	66

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.60
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.26
AVERAGE FLOW DEPTH(FEET) = 0.55 TRAVEL TIME(MIN.) = 0.52
Tc(MIN.) = 9.64
SUBAREA AREA(ACRES) = 1.90 SUBAREA RUNOFF(CFS) = 4.25
EFFECTIVE AREA(ACRES) = 3.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.4 PEAK FLOW RATE(CFS) = 7.61

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.62 FLOW VELOCITY(FEET/SEC.) = 6.70
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) = 570.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 243.00 CHANNEL SLOPE = 0.1111
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.688
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					

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LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
NATURAL FAIR COVER
"OPEN BRUSH" B 3.80 0.30 1.000 66
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.30 0.30 1.000 65
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 0.10 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 0.20 0.30 1.000 66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.51
AVERAGE FLOW DEPTH(FEET) = 0.80 TRAVEL TIME(MIN.) = 0.62
Tc(MIN.) = 10.26
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 9.68
EFFECTIVE AREA(ACRES) = 7.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 7.9 PEAK FLOW RATE(CFS) = 16.98

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.90 FLOW VELOCITY(FEET/SEC.) = 7.03
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.00 = 768.00 FEET.

FLOW PROCESS FROM NODE 433.00 TO NODE 433.10 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) = 564.00
FLOW LENGTH(FEET) = 1076.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.09
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.98
PIPE TRAVEL TIME(MIN.) = 2.94 Tc(MIN.) = 13.21
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.10 = 1844.00 FEET.

FLOW PROCESS FROM NODE 433.10 TO NODE 433.10 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

MAINLINE Tc(MIN.) = 13.21
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.327

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.70	0.30	0.900	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	5.40	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.613

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SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 14.66
EFFECTIVE AREA(ACRES) = 15.50 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.81
TOTAL AREA(ACRES) = 15.5 PEAK FLOW RATE(CFS) = 29.07

FLOW PROCESS FROM NODE 433.10 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) = 564.00 DOWNSTREAM(FEET) = 560.00
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.56
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 29.07
PIPE TRAVEL TIME(MIN.) = 2.11 Tc(MIN.) = 15.31
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.31
RAINFALL INTENSITY(INCH/HR) = 2.14
AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.81
EFFECTIVE STREAM AREA(ACRES) = 15.50
TOTAL STREAM AREA(ACRES) = 15.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 29.07

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	130.24	17.20	2.000	0.30(0.17)	0.56	79.0	400.00
2	29.07	15.31	2.138	0.30(0.24)	0.81	15.5	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	153.74	15.31	2.138	0.30(0.18)	0.61	85.8	430.00
2	157.20	17.20	2.000	0.30(0.18)	0.60	94.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 157.20 Tc(MIN.) = 17.20
EFFECTIVE AREA(ACRES) = 94.50 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 94.5
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

```
*****
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) = 560.00 DOWNSTREAM(FEET) = 557.00
FLOW LENGTH(FEET) = 377.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.90
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 157.20
PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 17.73
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 405.00 = 3051.00 FEET.
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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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```

```
MAINLINE Tc(MIN.) = 17.73
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.966
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.30 0.30 0.100 56
PUBLIC PARK B 0.90 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.20 0.30 0.200 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 4.50 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 3.20 0.30 0.400 56
COMMERCIAL B 1.20 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.406
SUBAREA AREA(ACRES) = 11.30 SUBAREA RUNOFF(CFS) = 18.75
EFFECTIVE AREA(ACRES) = 105.80 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 105.8 PEAK FLOW RATE(CFS) = 170.58
```

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```
*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
```

```
MAINLINE Tc(MIN.) = 17.73
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.966
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 0.20 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 4.20 0.30 0.500 56
RESIDENTIAL
```

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```
"8-10 DWELLINGS/ACRE" B 3.80 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.459
SUBAREA AREA(ACRES) = 8.30 SUBAREA RUNOFF(CFS) = 13.65
EFFECTIVE AREA(ACRES) = 114.10 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.57
TOTAL AREA(ACRES) = 114.1 PEAK FLOW RATE(CFS) = 184.24
```

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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
-----
```

```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
```

```
MAINLINE Tc(MIN.) = 17.73
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.966
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 4.80 0.30 0.200 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 5.20 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.307
SUBAREA AREA(ACRES) = 10.10 SUBAREA RUNOFF(CFS) = 17.03
EFFECTIVE AREA(ACRES) = 124.20 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 124.2 PEAK FLOW RATE(CFS) = 201.27
```

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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 406.00 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) = 557.00 DOWNSTREAM(FEET) = 535.00
FLOW LENGTH(FEET) = 525.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 32.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.90
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 201.27
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 18.10
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 406.00 = 3576.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81
-----
```

```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
```

```
MAINLINE Tc(MIN.) = 18.10
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.943
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" B 0.30 0.30 0.900 56
```

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PUBLIC PARK B 0.90 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 8.70 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
 PUBLIC PARK B 0.40 0.30 0.850 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.311
 SUBAREA AREA(ACRES) = 10.50 SUBAREA RUNOFF(CFS) = 17.48
 EFFECTIVE AREA(ACRES) = 134.70 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 134.7 PEAK FLOW RATE(CFS) = 216.18

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	216.69	16.21	2.069	0.30(0.16)	0.53	126.0	430.00
2	216.18	18.10	1.943	0.30(0.16)	0.53	134.7	400.00

NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) = 216.69 Tc(MIN.) = 16.21
 AREA-AVERAGED Fm(INCH/HR) = 0.16 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.53 EFFECTIVE AREA(ACRES) = 126.04

 FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 16.21
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.069 **D-10**
 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 9.00 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA(ACRES) = 9.00 SUBAREA RUNOFF(CFS) = 16.27
 EFFECTIVE AREA(ACRES) = 135.04 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 143.7 PEAK FLOW RATE(CFS) = 232.96

 FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 16.21
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.069 **D-11**
 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" B 0.30 0.30 0.600 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.50 0.30 0.900 56

RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 18.70 0.30 0.600 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 1.00 0.30 0.600 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.609
 SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 34.97
 EFFECTIVE AREA(ACRES) = 155.64 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 164.3 PEAK FLOW RATE(CFS) = 267.93

 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) = 535.00 DOWNSTREAM(FEET) = 510.00
 FLOW LENGTH(FEET) = 311.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 34.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 32.07
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 267.93
 PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 16.37
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 407.00 = 3887.00 FEET.

 FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 16.37
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.057 **D-11.1**
 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" B 0.10 0.30 0.500 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.10 0.30 0.900 56
 COMMERCIAL B 2.20 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.40 0.30 0.900 56
 COMMERCIAL B 1.10 0.30 0.100 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.353
 SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 8.61
 EFFECTIVE AREA(ACRES) = 160.54 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 169.2 PEAK FLOW RATE(CFS) = 274.90

 FLOW PROCESS FROM NODE 407.00 TO NODE 408.00 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) = 510.00 DOWNSTREAM(FEET) = 480.00
FLOW LENGTH(FEET) = 624.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 36.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.98
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 274.90
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 16.76
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 408.00 = 4511.00 FEET.

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*****
FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 16.76
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.030
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"   B        0.70    0.30   0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        1.60    0.30   0.600  56
COMMERCIAL          B        1.40    0.30   0.100  56
RESIDENTIAL
".4 DWELLING/ACRE"   B        4.80    0.30   0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        4.20    0.30   0.600  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B        2.20    0.30   0.500  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.649
SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 24.61
EFFECTIVE AREA(ACRES) = 175.44 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 184.1 PEAK FLOW RATE(CFS) = 295.57

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FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 16.76
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.030
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
RESIDENTIAL
".4 DWELLING/ACRE"   B        2.10    0.30   0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        6.60    0.30   0.600  56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B        2.00    0.30   0.500  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.625
SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 18.24

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EFFECTIVE AREA(ACRES) = 186.44 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 195.1 PEAK FLOW RATE(CFS) = 313.81

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*****
FLOW PROCESS FROM NODE 408.00 TO NODE 409.00 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) = 480.00 DOWNSTREAM(FEET) = 460.00
FLOW LENGTH(FEET) = 368.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 38.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.82
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 313.81
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 16.97
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 409.00 = 4879.00 FEET.

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FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 16.97
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.015
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA    Fp    Ap    SCS
LAND USE             GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK          B        0.70    0.30   0.850  56
RESIDENTIAL
".4 DWELLING/ACRE"   B        0.30    0.30   0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        2.20    0.30   0.600  56
APARTMENTS          B        0.20    0.30   0.200  56
COMMERCIAL          B        0.60    0.30   0.100  56
PUBLIC PARK          B        1.80    0.30   0.850  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.658
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 9.49
EFFECTIVE AREA(ACRES) = 192.24 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 200.9 PEAK FLOW RATE(CFS) = 320.85

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FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 16.97
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.015
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"   B        1.20    0.30   0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        2.90    0.30   0.600  56

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RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 3.30 0.30 0.500 56
 APARTMENTS B 0.10 0.30 0.200 56
 COMMERCIAL B 0.40 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.20 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.616
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 14.99
 EFFECTIVE AREA (ACRES) = 201.34 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 210.0 PEAK FLOW RATE (CFS) = 335.84

 FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 16.97
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.015
 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" B 3.80 0.30 0.600 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 2.00 0.30 0.500 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566
 SUBAREA AREA (ACRES) = 5.80 SUBAREA RUNOFF (CFS) = 9.64
 EFFECTIVE AREA (ACRES) = 207.14 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 215.8 PEAK FLOW RATE (CFS) = 345.48

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 FLOW PROCESS FROM NODE 409.00 TO NODE 410.00 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) = 445.00
 FLOW LENGTH (FEET) = 291.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.7 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 29.17
 ESTIMATED PIPE DIAMETER (INCH) = 51.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 345.48
 PIPE TRAVEL TIME (MIN.) = 0.17 Tc (MIN.) = 17.14
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 410.00 = 5170.00 FEET.

 FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 17.14
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.004
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 0.90 0.30 0.850 56
 APARTMENTS B 1.50 0.30 0.200 56
 COMMERCIAL B 0.80 0.30 0.100 56
 PUBLIC PARK B 2.30 0.30 0.850 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 1.40 0.30 0.600 56
 APARTMENTS B 3.10 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456
 SUBAREA AREA (ACRES) = 10.00 SUBAREA RUNOFF (CFS) = 16.81
 EFFECTIVE AREA (ACRES) = 217.14 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 225.8 PEAK FLOW RATE (CFS) = 360.19

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 FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 17.14
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.004
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 1.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.00 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.645
 SUBAREA AREA (ACRES) = 5.20 SUBAREA RUNOFF (CFS) = 8.47
 EFFECTIVE AREA (ACRES) = 222.34 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 231.0 PEAK FLOW RATE (CFS) = 368.66

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 FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 17.14
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.004
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 APARTMENTS B 2.10 0.30 0.200 56
 APARTMENTS B 8.90 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF (CFS) = 19.25
 EFFECTIVE AREA (ACRES) = 233.34 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA (ACRES) = 242.0 PEAK FLOW RATE (CFS) = 387.91

D-14.1

 FLOW PROCESS FROM NODE 410.00 TO NODE 411.00 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) = 445.00 DOWNSTREAM(FEET) = 425.00
FLOW LENGTH(FEET) = 324.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 31.97
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 387.91
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 17.31
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 411.00 = 5494.00 FEET.

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FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.31
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.993
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA      Fp        Ap    SCS
  LAND USE           GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
APARTMENTS            B        0.10     0.30     0.200   56
COMMERCIAL             B        0.20     0.30     0.100   56
PUBLIC PARK           B        1.70     0.30     0.850   56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        0.70     0.30     0.200   56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        0.20     0.30     0.600   56
COMMERCIAL            B        0.70     0.30     0.100   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.504
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 5.97
EFFECTIVE AREA(ACRES) = 236.94 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 245.6 PEAK FLOW RATE(CFS) = 391.52

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*****
FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.31
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.993
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA      Fp        Ap    SCS
  LAND USE           GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
PUBLIC PARK           B        0.90     0.30     0.850   56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        8.80     0.30     0.200   56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        0.20     0.30     0.600   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.267
SUBAREA AREA(ACRES) = 9.90 SUBAREA RUNOFF(CFS) = 17.04
EFFECTIVE AREA(ACRES) = 246.84 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51

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TOTAL AREA(ACRES) = 255.5 PEAK FLOW RATE(CFS) = 408.56

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FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.31
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.993
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/    SCS SOIL  AREA      Fp        Ap    SCS
  LAND USE           GROUP  (ACRES)  (INCH/HR) (DECIMAL) CN
APARTMENTS            B        0.50     0.30     0.200   56
RESIDENTIAL
".4 DWELLING/ACRE"   B        0.10     0.30     0.900   56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        2.10     0.30     0.600   56
APARTMENTS            B        0.70     0.30     0.200   56
RESIDENTIAL
".4 DWELLING/ACRE"   B        0.10     0.30     0.900   56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        4.30     0.30     0.600   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.546
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 12.84
EFFECTIVE AREA(ACRES) = 254.64 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 263.3 PEAK FLOW RATE(CFS) = 421.40

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FLOW PROCESS FROM NODE 411.00 TO NODE 412.00 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) = 425.00 DOWNSTREAM(FEET) = 392.00
FLOW LENGTH(FEET) = 641.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 44.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.34
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 421.40
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 17.66
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 412.00 = 6135.00 FEET.

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FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.66
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.970
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
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        5.30     0.30     0.200   56
RESIDENTIAL

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".4 DWELLING/ACRE"      B      0.10   0.30   0.900   56
COMMERCIAL              B      1.10   0.30   0.100   56
RESIDENTIAL
"11+ DWELLINGS/ACRE"   B      7.30   0.30   0.200   56
RESIDENTIAL
".4 DWELLING/ACRE"      B      0.10   0.30   0.900   56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.198
SUBAREA AREA(ACRES) = 14.50   SUBAREA RUNOFF(CFS) = 24.94
EFFECTIVE AREA(ACRES) = 269.14   AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 277.8   PEAK FLOW RATE(CFS) = 441.10

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*****
FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 17.66
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.970
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      0.20   0.30   0.200   56
COMMERCIAL          B      0.20   0.30   0.100   56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      4.10   0.30   0.200   56
RESIDENTIAL
".4 DWELLING/ACRE"   B      0.60   0.30   0.900   56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B     3.10   0.30   0.400   56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      0.50   0.30   0.200   56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.317
SUBAREA AREA(ACRES) = 8.70   SUBAREA RUNOFF(CFS) = 14.68
EFFECTIVE AREA(ACRES) = 277.84   AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 286.5   PEAK FLOW RATE(CFS) = 455.78

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*****
FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 17.66
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.970
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"   B      0.50   0.30   0.900   56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B     4.00   0.30   0.400   56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.456
SUBAREA AREA(ACRES) = 4.50   SUBAREA RUNOFF(CFS) = 7.43

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EFFECTIVE AREA(ACRES) = 282.34   AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 291.0   PEAK FLOW RATE(CFS) = 463.20

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*****
FLOW PROCESS FROM NODE 412.00 TO NODE 420.00 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) = 392.00   DOWNSTREAM(FEET) = 350.00
FLOW LENGTH(FEET) = 1358.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 48.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.98
ESTIMATED PIPE DIAMETER(INCH) = 63.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 463.20
PIPE TRAVEL TIME(MIN.) = 0.87   Tc(MIN.) = 18.53
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 420.00 = 7493.00 FEET.

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*****
FLOW PROCESS FROM NODE 420.00 TO NODE 420.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.53
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.917
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B      0.50   0.30   0.100   56
COMMERCIAL          B      1.30   0.30   0.100   56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      0.10   0.30   0.200   56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.105
SUBAREA AREA(ACRES) = 1.90   SUBAREA RUNOFF(CFS) = 3.22
EFFECTIVE AREA(ACRES) = 284.24   AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 292.9   PEAK FLOW RATE(CFS) = 463.20
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 420.00 TO NODE 421.00 IS CODE = 51
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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 346.00   DOWNSTREAM(FEET) = 320.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1617.00   CHANNEL SLOPE = 0.0161
CHANNEL BASE(FEET) = 200.00   "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.618
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp      Ap      SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B      6.90   0.30   0.100   56
COMMERCIAL          B      3.60   0.30   0.100   56
COMMERCIAL          B      2.20   0.30   0.100   56

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RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.70 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.40 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.30 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.227
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 473.73
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.24
 AVERAGE FLOW DEPTH (FEET) = 0.55 TRAVEL TIME (MIN.) = 6.36
 Tc (MIN.) = 24.89
 SUBAREA AREA (ACRES) = 15.10 SUBAREA RUNOFF (CFS) = 21.07
 EFFECTIVE AREA (ACRES) = 299.34 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 308.0 PEAK FLOW RATE (CFS) = 463.20
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.55 FLOW VELOCITY (FEET/SEC.) = 4.20
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 421.00 = 9110.00 FEET.

 FLOW PROCESS FROM NODE 421.00 TO NODE 421.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 24.89
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 1.618
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.10	0.30	0.850	56
PUBLIC PARK	B	2.50	0.30	0.850	56
PUBLIC PARK	B	3.60	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
 SUBAREA AREA (ACRES) = 7.20 SUBAREA RUNOFF (CFS) = 8.84
 EFFECTIVE AREA (ACRES) = 306.54 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA (ACRES) = 315.2 PEAK FLOW RATE (CFS) = 463.20
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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 FLOW PROCESS FROM NODE 421.00 TO NODE 427.00 IS CODE = 31

>>>>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) = 1453.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 84.0 INCH PIPE IS 63.6 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 14.82
 ESTIMATED PIPE DIAMETER (INCH) = 84.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 463.20
 PIPE TRAVEL TIME (MIN.) = 1.63 Tc (MIN.) = 26.52
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

 FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 26.52
 RAINFALL INTENSITY (INCH/HR) = 1.56
 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.48
 EFFECTIVE STREAM AREA (ACRES) = 306.54
 TOTAL STREAM AREA (ACRES) = 315.20
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 463.20

 FLOW PROCESS FROM NODE 413.00 TO NODE 414.00 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) = 515.00 DOWNSTREAM (FEET) = 497.00

Tc = K * [(LENGTH** 3.00) / (ELEVATION CHANGE)]** 0.20
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 5.533
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 3.831
 SUBAREA Tc AND LOSS RATE DATA (AMC II):

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DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	B	0.10	0.30	0.100	56	5.53
PUBLIC PARK	B	1.10	0.30	0.850	56	8.79
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56	7.50
COMMERCIAL	B	0.10	0.30	0.100	56	5.53
PUBLIC PARK	B	0.30	0.30	0.850	56	8.79
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56	7.50

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.678
 SUBAREA RUNOFF (CFS) = 10.45
 TOTAL AREA (ACRES) = 3.20 PEAK FLOW RATE (CFS) = 10.45

 FLOW PROCESS FROM NODE 414.00 TO NODE 414.10 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION (FEET) = 497.00 DOWNSTREAM ELEVATION (FEET) = 493.00
 STREET LENGTH (FEET) = 371.00 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) = 16.94
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 17.07
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.03
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.42
STREET FLOW TRAVEL TIME(MIN.) = 2.04 Tc(MIN.) = 7.57
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.200

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SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 1.40 0.30 0.850 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.40 0.30 0.600 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 2.00 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.673
SUBAREA AREA(ACRES) = 4.80 SUBAREA RUNOFF(CFS) = 12.95
EFFECTIVE AREA(ACRES) = 8.00 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.68
TOTAL AREA(ACRES) = 8.0 PEAK FLOW RATE(CFS) = 21.58

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 18.87
FLOW VELOCITY(FEET/SEC.) = 3.20 DEPTH*VELOCITY(FT*FT/SEC.) = 1.60
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.10 = 701.00 FEET.

FLOW PROCESS FROM NODE 414.10 TO NODE 414.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====

UPSTREAM ELEVATION(FEET) = 493.00 DOWNSTREAM ELEVATION(FEET) = 490.00
STREET LENGTH(FEET) = 476.00 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) = 27.92
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.58
HALFSTREET FLOOD WIDTH(FEET) = 23.24
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.78
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.61

STREET FLOW TRAVEL TIME(MIN.) = 2.85 Tc(MIN.) = 10.43
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.665

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SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 0.50 0.30 0.100 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.40 0.30 0.600 56
COMMERCIAL B 0.40 0.30 0.100 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.20 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512
SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 12.65
EFFECTIVE AREA(ACRES) = 13.60 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.61
TOTAL AREA(ACRES) = 13.6 PEAK FLOW RATE(CFS) = 30.38

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 24.02
FLOW VELOCITY(FEET/SEC.) = 2.84 DEPTH*VELOCITY(FT*FT/SEC.) = 1.68
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.20 = 1177.00 FEET.

FLOW PROCESS FROM NODE 414.20 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) = 490.00 DOWNSTREAM(FEET) = 465.00
FLOW LENGTH(FEET) = 488.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.99
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 30.38
PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 10.93
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 415.00 = 1665.00 FEET.

FLOW PROCESS FROM NODE 415.00 TO NODE 415.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

MAINLINE Tc(MIN.) = 10.93
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.593
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" B 0.10 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 2.30 0.30 0.600 56
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 0.80 0.30 0.100 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.20 0.30 0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

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SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.537$
 SUBAREA AREA (ACRES) = 6.50 SUBAREA RUNOFF (CFS) = 14.23
 EFFECTIVE AREA (ACRES) = 20.10 AREA-AVERAGED F_m (INCH/HR) = 0.18
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.59$
 TOTAL AREA (ACRES) = 20.1 PEAK FLOW RATE (CFS) = 43.73

 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) = 465.00 DOWNSTREAM (FEET) = 440.00
 FLOW LENGTH (FEET) = 497.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.9 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 17.36
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 43.73
 PIPE TRAVEL TIME (MIN.) = 0.48 T_c (MIN.) = 11.41
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 416.00 = 2162.00 FEET.

 FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE T_c (MIN.) = 11.41
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.530 **D-26**
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
COMMERCIAL	B	0.80	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	3.70	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.392$
 SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 10.64
 EFFECTIVE AREA (ACRES) = 25.00 AREA-AVERAGED F_m (INCH/HR) = 0.16
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.55$
 TOTAL AREA (ACRES) = 25.0 PEAK FLOW RATE (CFS) = 53.23

 FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE T_c (MIN.) = 11.41
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.530 **D-25**
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	1.80	0.30	0.200	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

RESIDENTIAL

"3-4 DWELLINGS/ACRE" B 1.60 0.30 0.600 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 3.60 0.30 0.200 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 3.00 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.389$
 SUBAREA AREA (ACRES) = 10.10 SUBAREA RUNOFF (CFS) = 21.94
 EFFECTIVE AREA (ACRES) = 35.10 AREA-AVERAGED F_m (INCH/HR) = 0.15
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.50$
 TOTAL AREA (ACRES) = 35.1 PEAK FLOW RATE (CFS) = 75.17

 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) = 440.00 DOWNSTREAM (FEET) = 420.00
 FLOW LENGTH (FEET) = 437.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.3 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 19.20
 ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 75.17
 PIPE TRAVEL TIME (MIN.) = 0.38 T_c (MIN.) = 11.79
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 417.00 = 2599.00 FEET.

 FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE T_c (MIN.) = 11.79 **D-27**
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.483
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	1.50	0.30	0.200	56
COMMERCIAL	B	0.70	0.30	0.100	56
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	3.40	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.188$
 SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 12.23
 EFFECTIVE AREA (ACRES) = 40.70 AREA-AVERAGED F_m (INCH/HR) = 0.14
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.46$
 TOTAL AREA (ACRES) = 40.7 PEAK FLOW RATE (CFS) = 85.92

 FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE T_c (MIN.) = 11.79
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.483
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
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LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	B	4.60	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	4.00	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
COMMERCIAL	B	1.50	0.30	0.100	56
PUBLIC PARK	B	2.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.60	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.264
SUBAREA AREA(ACRES) = 14.00 SUBAREA RUNOFF(CFS) = 30.29
EFFECTIVE AREA(ACRES) = 54.70 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 54.7 PEAK FLOW RATE(CFS) = 116.21

FLOW PROCESS FROM NODE 417.00 TO NODE 418.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 420.00 DOWNSTREAM(FEET) = 400.00
FLOW LENGTH(FEET) = 619.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 27.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.96
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 116.21
PIPE TRAVEL TIME(MIN.) = 0.54 Tc(MIN.) = 12.33
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 418.00 = 3218.00 FEET.

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 12.33
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.420
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	B	2.10	0.30	0.100	56
COMMERCIAL	B	3.90	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	5.50	0.30	0.500	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	3.20	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.333
SUBAREA AREA(ACRES) = 15.60 SUBAREA RUNOFF(CFS) = 32.57
EFFECTIVE AREA(ACRES) = 70.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 70.3 PEAK FLOW RATE(CFS) = 145.66

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FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 12.33
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.420
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"	B	0.30	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.40	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.10	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
SUBAREA AREA(ACRES) = 4.00 SUBAREA RUNOFF(CFS) = 8.27
EFFECTIVE AREA(ACRES) = 74.30 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA(ACRES) = 74.3 PEAK FLOW RATE(CFS) = 153.93

D-30

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 12.33
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.420
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					
"11+ DWELLINGS/ACRE"	B	2.20	0.30	0.200	56
COMMERCIAL	B	3.70	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.50	0.30	0.200	56
COMMERCIAL	B	0.70	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.154
SUBAREA AREA(ACRES) = 10.80 SUBAREA RUNOFF(CFS) = 23.07
EFFECTIVE AREA(ACRES) = 85.10 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 85.1 PEAK FLOW RATE(CFS) = 177.00

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FLOW PROCESS FROM NODE 418.00 TO NODE 425.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 320.00

FLOW LENGTH(FEET) = 1179.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 27.69
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 177.00
 PIPE TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 13.04
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 425.00 = 4397.00 FEET.

 FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 13.04
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.343 **D-33**
 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	B	0.40	0.30	0.100	56
COMMERCIAL	B	0.90	0.30	0.100	56
PUBLIC PARK	B	5.30	0.30	0.850	56
PUBLIC PARK	B	3.10	0.30	0.850	56
PUBLIC PARK	B	9.10	0.30	0.850	56

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.777
 SUBAREA AREA(ACRES) = 19.40 SUBAREA RUNOFF(CFS) = 36.85
 EFFECTIVE AREA(ACRES) = 104.50 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
 TOTAL AREA(ACRES) = 104.5 PEAK FLOW RATE(CFS) = 208.00

 FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 13.04
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.343 **D-33**
 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	1.30	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.90	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.90	0.30	0.900	56

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 9.52
 EFFECTIVE AREA(ACRES) = 109.60 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 109.6 PEAK FLOW RATE(CFS) = 217.52

 FLOW PROCESS FROM NODE 425.00 TO NODE 426.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 320.00 DOWNSTREAM(FEET) = 316.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 870.00 CHANNEL SLOPE = 0.0046
 GIVEN CHANNEL BASE(FEET) = 200.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.52
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.846

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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	B	3.40	0.30	0.100	56
COMMERCIAL	B	3.30	0.30	0.100	56
PUBLIC PARK	B	0.80	0.30	0.850	56
PUBLIC PARK	B	0.30	0.30	0.850	56

RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.90 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.30 0.30 0.900 56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.408
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 226.06
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.15
 AVERAGE FLOW DEPTH(FEET) = 0.52 TRAVEL TIME(MIN.) = 6.74
 Tc(MIN.) = 19.79
 SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 17.06
 EFFECTIVE AREA(ACRES) = 120.60 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 120.6 PEAK FLOW RATE(CFS) = 217.52
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
 GIVEN CHANNEL BASE(FEET) = 200.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.51

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.51 FLOW VELOCITY(FEET/SEC.) = 2.12
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 426.00 = 5267.00 FEET.

 FLOW PROCESS FROM NODE 426.00 TO NODE 426.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.79
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.846 **D-37**
 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
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.70	0.30	0.900	56
PUBLIC PARK	B	0.50	0.30	0.850	56

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.569
 SUBAREA AREA(ACRES) = 3.70 SUBAREA RUNOFF(CFS) = 5.58
 EFFECTIVE AREA(ACRES) = 124.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 124.3 PEAK FLOW RATE(CFS) = 217.52

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

```
*****
FLOW PROCESS FROM NODE 426.00 TO NODE 427.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 316.00 DOWNSTREAM(FEET) = 310.00
FLOW LENGTH(FEET) = 321.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 41.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.60
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 217.52
PIPE TRAVEL TIME(MIN.) = 0.30 Tc(MIN.) = 20.09
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 427.00 = 5588.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 20.09
RAINFALL INTENSITY(INCH/HR) = 1.83
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.46
EFFECTIVE STREAM AREA(ACRES) = 124.30
TOTAL STREAM AREA(ACRES) = 124.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 217.52
```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	463.20	26.52	1.561	0.30(0.15)	0.48	306.5	430.00
1	448.09	28.54	1.496	0.30(0.15)	0.49	315.2	400.00
2	217.52	20.09	1.830	0.30(0.14)	0.46	124.3	413.00

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	635.17	20.09	1.830	0.30(0.14)	0.48	356.6	413.00
2	646.14	26.52	1.561	0.30(0.14)	0.48	430.8	430.00
3	622.75	28.54	1.496	0.30(0.14)	0.48	439.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 646.14 Tc(MIN.) = 26.52
EFFECTIVE AREA(ACRES) = 430.84 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 439.5
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

```
*****
FLOW PROCESS FROM NODE 427.00 TO NODE 428.00 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) = 275.00
FLOW LENGTH(FEET) = 789.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 52.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 32.17
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 646.14
PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 26.93
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 428.00 = 11352.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 439.5 TC(MIN.) = 26.93
EFFECTIVE AREA(ACRES) = 430.84 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.477
PEAK FLOW RATE(CFS) = 646.14
```

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	635.17	20.50	1.809	0.30(0.14)	0.48	356.6	413.00
2	646.14	26.93	1.547	0.30(0.14)	0.48	430.8	430.00
3	622.75	28.95	1.484	0.30(0.14)	0.48	439.5	400.00

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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92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA D ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 50-YR EV SEPTEMBER 2018 CCHI *

FILE NAME: PA3D50EV.DAT
TIME/DATE OF STUDY: 11:54 09/25/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 15.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 4.440
- 2) 10.00; 3.010
- 3) 15.00; 2.390
- 4) 20.00; 2.030
- 5) 25.00; 1.790
- 6) 30.00; 1.600
- 7) 40.00; 1.370
- 8) 50.00; 1.200
- 9) 60.00; 1.060
- 10) 90.00; 0.860
- 11) 120.00; 0.730
- 12) 180.00; 0.590
- 13) 360.00; 0.410
- 14) 1200.00; 0.170

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 (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

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) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 605.00 DOWNSTREAM(FEET) = 586.00

Tc = K*(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.417
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.749

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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"	B	1.20	0.30	0.900	56	8.77
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	1.30	0.30	0.600	56	7.42
PUBLIC PARK	B	2.40	0.30	0.850	56	8.70

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.796
SUBAREA RUNOFF(CFS) = 15.48
TOTAL AREA(ACRES) = 4.90 PEAK FLOW RATE(CFS) = 15.48

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) = 586.00 DOWNSTREAM ELEVATION(FEET) = 583.00
STREET LENGTH(FEET) = 333.00 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) = 25.30
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.53
HALFSTREET FLOOD WIDTH(FEET) = 20.82
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.11
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.66
STREET FLOW TRAVEL TIME(MIN.) = 1.78 Tc(MIN.) = 9.20

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.239

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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"	B	0.10	0.30	0.900	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.90	0.30	0.400	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.70	0.30	0.600	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.565					
SUBAREA AREA(ACRES) = 7.10					
SUBAREA RUNOFF(CFS) = 19.61					
EFFECTIVE AREA(ACRES) = 12.00					
AREA-AVERAGED Fm(INCH/HR) = 0.20					
AREA-AVERAGED Fp(INCH/HR) = 0.30					
AREA-AVERAGED Ap = 0.66					
TOTAL AREA(ACRES) = 12.0					
PEAK FLOW RATE(CFS) = 32.84					

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.57 HALFSTREET FLOOD WIDTH(FEET) = 23.09
FLOW VELOCITY(FEET/SEC.) = 3.32 DEPTH*VELOCITY(FT*FT/SEC.) = 1.91
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.00 = 663.00 FEET.

FLOW PROCESS FROM NODE 402.00 TO NODE 402.50 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 583.00 DOWNSTREAM ELEVATION(FEET) = 580.00
STREET LENGTH(FEET) = 315.00 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) = 38.69

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.60
HALFSTREET FLOOD WIDTH(FEET) = 24.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.53
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.11
STREET FLOW TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 10.69

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.925

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.80	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56

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RESIDENTIAL

"8-10 DWELLINGS/ACRE" B 2.30 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 11.70
EFFECTIVE AREA(ACRES) = 16.70 AREA-AVERAGED Fm(INCH/HR) = 0.19
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.62
TOTAL AREA(ACRES) = 16.7 PEAK FLOW RATE(CFS) = 41.15

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.61 HALFSTREET FLOOD WIDTH(FEET) = 24.96
FLOW VELOCITY(FEET/SEC.) = 3.57 DEPTH*VELOCITY(FT*FT/SEC.) = 2.17
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.50 = 978.00 FEET.

FLOW PROCESS FROM NODE 402.50 TO NODE 403.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 580.00 DOWNSTREAM ELEVATION(FEET) = 579.00
STREET LENGTH(FEET) = 394.00 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) = 44.55

STREET FLOWING FULL

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.75
HALFSTREET FLOOD WIDTH(FEET) = 33.93
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.27
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.70
STREET FLOW TRAVEL TIME(MIN.) = 2.89 Tc(MIN.) = 13.58

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.567

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.80	0.30	0.400	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.435					
SUBAREA AREA(ACRES) = 3.10					
SUBAREA RUNOFF(CFS) = 6.80					
EFFECTIVE AREA(ACRES) = 19.80					
AREA-AVERAGED Fm(INCH/HR) = 0.18					
AREA-AVERAGED Fp(INCH/HR) = 0.30					
AREA-AVERAGED Ap = 0.59					
TOTAL AREA(ACRES) = 19.8					
PEAK FLOW RATE(CFS) = 42.57					

END OF SUBAREA STREET FLOW HYDRAULICS:

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DEPTH(FEET) = 0.74 HALFSTREET FLOOD WIDTH(FEET) = 33.51
FLOW VELOCITY(FEET/SEC.) = 2.24 DEPTH*VELOCITY(FT*FT/SEC.) = 1.65
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 1372.00 FEET.

FLOW PROCESS FROM NODE 403.00 TO NODE 404.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 579.00 DOWNSTREAM ELEVATION(FEET) = 560.00
STREET LENGTH(FEET) = 974.00 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) = 51.09

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.58
HALFSTREET FLOOD WIDTH(FEET) = 23.63
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.93
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.88
STREET FLOW TRAVEL TIME(MIN.) = 3.29 Tc(MIN.) = 16.87

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.255

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	5.80	0.30	0.100	56
COMMERCIAL	B	0.70	0.30	0.100	56
PUBLIC PARK	B	1.10	0.30	0.850	56
PUBLIC PARK	B	0.70	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.267

SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 17.03

EFFECTIVE AREA(ACRES) = 28.50 AREA-AVERAGED Fm(INCH/HR) = 0.15

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49

TOTAL AREA(ACRES) = 28.5 PEAK FLOW RATE(CFS) = 54.06

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.59 HALFSTREET FLOOD WIDTH(FEET) = 24.10
FLOW VELOCITY(FEET/SEC.) = 5.02 DEPTH*VELOCITY(FT*FT/SEC.) = 2.98
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 404.00 = 2346.00 FEET.

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.87
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.255
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" B 0.10 0.30 1.000 66
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.30 0.30 0.900 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 2.70 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 3.40 0.30 0.400 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 5.30 0.30 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.432
SUBAREA AREA(ACRES) = 13.90 SUBAREA RUNOFF(CFS) = 26.60
EFFECTIVE AREA(ACRES) = 42.40 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 42.4 PEAK FLOW RATE(CFS) = 80.65

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FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.87
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.255
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" B 0.20 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.36
EFFECTIVE AREA(ACRES) = 42.60 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 42.6 PEAK FLOW RATE(CFS) = 81.01

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FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.87
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.255
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.10 0.30 0.100 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
RESIDENTIAL

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"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56
 PUBLIC PARK B 1.50 0.30 0.850 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 2.50 0.30 0.500 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.590
 SUBAREA AREA (ACRES) = 4.50 SUBAREA RUNOFF (CFS) = 8.42
 EFFECTIVE AREA (ACRES) = 47.10 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA (ACRES) = 47.1 PEAK FLOW RATE (CFS) = 89.43

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 16.87
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.255
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 2.80 0.30 0.850 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 3.00 0.30 0.900 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 6.40 0.30 0.500 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 6.70 0.30 0.600 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 4.30 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 8.70 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.671
 SUBAREA AREA (ACRES) = 31.90 SUBAREA RUNOFF (CFS) = 58.98
 EFFECTIVE AREA (ACRES) = 79.00 AREA-AVERAGED Fm (INCH/HR) = 0.17
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.56
 TOTAL AREA (ACRES) = 79.0 PEAK FLOW RATE (CFS) = 148.41

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 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION (MIN.) = 16.87
 RAINFALL INTENSITY (INCH/HR) = 2.26
 AREA-AVERAGED Fm (INCH/HR) = 0.17
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.56
 EFFECTIVE STREAM AREA (ACRES) = 79.00
 TOTAL STREAM AREA (ACRES) = 79.00
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 148.41

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) = 729.00 DOWNSTREAM (FEET) = 630.00

Tc = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.120
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 3.262
 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" B 0.10 0.30 1.000 72 9.12
 NATURAL FAIR COVER
 "OPEN BRUSH" B 1.30 0.30 1.000 66 9.12
 NATURAL FAIR COVER
 "OPEN BRUSH" B 0.10 0.30 1.000 66 9.12
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF (CFS) = 4.00
 TOTAL AREA (ACRES) = 1.50 PEAK FLOW RATE (CFS) = 4.00

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 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
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 3.116
 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" B 1.70 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL, NARROWLEAF" B 0.10 0.30 1.000 72
 NATURAL FAIR COVER
 "OPEN BRUSH" B 0.10 0.30 1.000 66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 6.41
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.41
 AVERAGE FLOW DEPTH (FEET) = 0.58 TRAVEL TIME (MIN.) = 0.51
 Tc (MIN.) = 9.63
 SUBAREA AREA (ACRES) = 1.90 SUBAREA RUNOFF (CFS) = 4.82
 EFFECTIVE AREA (ACRES) = 3.40 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 3.4 PEAK FLOW RATE (CFS) = 8.62

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.64 FLOW VELOCITY (FEET/SEC.) = 6.93

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) = 570.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 243.00 CHANNEL SLOPE = 0.1111
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.981

OD-3

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	0.10	0.30	0.900	56
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.80	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.30	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	0.10	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.20	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.05
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.69
AVERAGE FLOW DEPTH(FEET) = 0.84 TRAVEL TIME(MIN.) = 0.61
Tc(MIN.) = 10.23
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 10.86
EFFECTIVE AREA(ACRES) = 7.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 7.9 PEAK FLOW RATE(CFS) = 19.06

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.94 FLOW VELOCITY(FEET/SEC.) = 7.26
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.00 = 768.00 FEET.

FLOW PROCESS FROM NODE 433.00 TO NODE 433.10 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) = 564.00
FLOW LENGTH(FEET) = 1076.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.21
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.06
PIPE TRAVEL TIME(MIN.) = 2.89 Tc(MIN.) = 13.12
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.10 = 1844.00 FEET.

FLOW PROCESS FROM NODE 433.10 TO NODE 433.10 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.12
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.623

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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
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.70	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	5.40	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.613
SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 16.69
EFFECTIVE AREA(ACRES) = 15.50 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.81
TOTAL AREA(ACRES) = 15.5 PEAK FLOW RATE(CFS) = 33.21

FLOW PROCESS FROM NODE 433.10 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) = 564.00 DOWNSTREAM(FEET) = 560.00
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.67
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 33.21
PIPE TRAVEL TIME(MIN.) = 2.07 Tc(MIN.) = 15.19
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.19
RAINFALL INTENSITY (INCH/HR) = 2.38
AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.81
EFFECTIVE STREAM AREA(ACRES) = 15.50
TOTAL STREAM AREA(ACRES) = 15.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 33.21

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	148.41	16.87	2.255	0.30 (0.17)	0.56	79.0	400.00
2	33.21	15.19	2.376	0.30 (0.24)	0.81	15.5	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	174.59	15.19	2.376	0.30 (0.18)	0.61	86.7	430.00
2	179.74	16.87	2.255	0.30 (0.18)	0.60	94.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 179.74 Tc (MIN.) = 16.87
EFFECTIVE AREA (ACRES) = 94.50 AREA-AVERAGED Fm (INCH/HR) = 0.18
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.60
TOTAL AREA (ACRES) = 94.5
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

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) = 560.00 DOWNSTREAM (FEET) = 557.00
FLOW LENGTH (FEET) = 377.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 43.7 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 12.33
ESTIMATED PIPE DIAMETER (INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 179.74
PIPE TRAVEL TIME (MIN.) = 0.51 Tc (MIN.) = 17.38
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 405.00 = 3051.00 FEET.

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 17.38
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.219

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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	B	1.30	0.30	0.100	56
PUBLIC PARK	B	0.90	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.20	0.30	0.200	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	4.50	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.20	0.30	0.400	56
COMMERCIAL	B	1.20	0.30	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.406
SUBAREA AREA (ACRES) = 11.30 SUBAREA RUNOFF (CFS) = 21.33
EFFECTIVE AREA (ACRES) = 105.80 AREA-AVERAGED Fm (INCH/HR) = 0.17
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.58
TOTAL AREA (ACRES) = 105.8 PEAK FLOW RATE (CFS) = 194.69

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 17.38
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.219

D-9

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	4.20	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.80	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.459
SUBAREA AREA (ACRES) = 8.30 SUBAREA RUNOFF (CFS) = 15.55
EFFECTIVE AREA (ACRES) = 114.10 AREA-AVERAGED Fm (INCH/HR) = 0.17
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.57
TOTAL AREA (ACRES) = 114.1 PEAK FLOW RATE (CFS) = 210.24

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 17.38
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.219

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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					
"11+ DWELLINGS/ACRE"	B	4.80	0.30	0.200	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	5.20	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.307
SUBAREA AREA (ACRES) = 10.10 SUBAREA RUNOFF (CFS) = 19.33
EFFECTIVE AREA (ACRES) = 124.20 AREA-AVERAGED Fm (INCH/HR) = 0.17
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
TOTAL AREA (ACRES) = 124.2 PEAK FLOW RATE (CFS) = 229.57

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) = 557.00 DOWNSTREAM (FEET) = 535.00
FLOW LENGTH (FEET) = 525.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 36.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 24.24
ESTIMATED PIPE DIAMETER (INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 229.57

PIPE TRAVEL TIME(MIN.) = 0.36 Tc(MIN.) = 17.74
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 406.00 = 3576.00 FEET.

FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 17.74
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.193 **D-10**
 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	0.30	0.30	0.900	56
PUBLIC PARK	B	0.90	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	8.70	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
PUBLIC PARK	B	0.40	0.30	0.850	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.311
 SUBAREA AREA(ACRES) = 10.50 SUBAREA RUNOFF(CFS) = 19.84
 EFFECTIVE AREA(ACRES) = 134.70 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 134.7 PEAK FLOW RATE(CFS) = 246.50

FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 17.74
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.193 **D-10**
 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	9.00	0.30	0.200	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA(ACRES) = 9.00 SUBAREA RUNOFF(CFS) = 17.28
 EFFECTIVE AREA(ACRES) = 143.70 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 143.7 PEAK FLOW RATE(CFS) = 263.78

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	264.21	16.06	2.313	0.30(0.15)	0.51	135.9	430.00
2	263.78	17.74	2.193	0.30(0.15)	0.51	143.7	400.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 264.21 Tc(MIN.) = 16.06
 AREA-AVERAGED Fm(INCH/HR) = 0.15 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.51 EFFECTIVE AREA(ACRES) = 135.85

FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.06
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.313 **D-11**
 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	0.30	0.30	0.600	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	18.70	0.30	0.600	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.00	0.30	0.600	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.609
 SUBAREA AREA(ACRES) = 20.60 SUBAREA RUNOFF(CFS) = 39.50
 EFFECTIVE AREA(ACRES) = 156.45 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 164.3 PEAK FLOW RATE(CFS) = 303.72

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) = 535.00 DOWNSTREAM(FEET) = 510.00
 FLOW LENGTH(FEET) = 311.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 33.46
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 303.72
 PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 16.22
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 407.00 = 3887.00 FEET.

FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.22
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.302 **D-11.1**
 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"	B	0.10	0.30	0.500	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.10	0.30	0.900	56
COMMERCIAL	B	2.20	0.30	0.100	56

RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.40 0.30 0.900 56
 COMMERCIAL B 1.10 0.30 0.100 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.353
 SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 9.69
 EFFECTIVE AREA (ACRES) = 161.35 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA (ACRES) = 169.2 PEAK FLOW RATE (CFS) = 311.83

 FLOW PROCESS FROM NODE 407.00 TO NODE 408.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 510.00 DOWNSTREAM(FEET) = 480.00
 FLOW LENGTH(FEET) = 624.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 27.97
 ESTIMATED PIPE DIAMETER (INCH) = 51.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 311.83
 PIPE TRAVEL TIME (MIN.) = 0.37 Tc (MIN.) = 16.59
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 408.00 = 4511.00 FEET.

 FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 16.59
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.275
 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	0.70	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.60	0.30	0.600	56
COMMERCIAL	B	1.40	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	4.80	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.20	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.20	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.649
 SUBAREA AREA (ACRES) = 14.90 SUBAREA RUNOFF (CFS) = 27.90
 EFFECTIVE AREA (ACRES) = 176.25 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA (ACRES) = 184.1 PEAK FLOW RATE (CFS) = 335.85

 FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 16.59
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.275
 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
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.10	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	6.60	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.00	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.625
 SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF (CFS) = 20.67
 EFFECTIVE AREA (ACRES) = 187.25 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA (ACRES) = 195.1 PEAK FLOW RATE (CFS) = 356.52

 FLOW PROCESS FROM NODE 408.00 TO NODE 409.00 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) = 460.00
 FLOW LENGTH(FEET) = 368.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.9 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 29.97
 ESTIMATED PIPE DIAMETER (INCH) = 51.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 356.52
 PIPE TRAVEL TIME (MIN.) = 0.20 Tc (MIN.) = 16.80
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 409.00 = 4879.00 FEET.

 FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 16.80
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.261
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.70	0.30	0.850	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.20	0.30	0.600	56
APARTMENTS	B	0.20	0.30	0.200	56
COMMERCIAL	B	0.60	0.30	0.100	56
PUBLIC PARK	B	1.80	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.658
 SUBAREA AREA (ACRES) = 5.80 SUBAREA RUNOFF (CFS) = 10.77
 EFFECTIVE AREA (ACRES) = 193.05 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 200.9 PEAK FLOW RATE (CFS) = 364.80

FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.80

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.261

D-13

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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RESIDENTIAL
".4 DWELLING/ACRE" B 1.20 0.30 0.900 56

RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 2.90 0.30 0.600 56

RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 3.30 0.30 0.500 56

APARTMENTS B 0.10 0.30 0.200 56

COMMERCIAL B 0.40 0.30 0.100 56

RESIDENTIAL
".4 DWELLING/ACRE" B 1.20 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.616

SUBAREA AREA(ACRES) = 9.10 SUBAREA RUNOFF(CFS) = 17.00

EFFECTIVE AREA(ACRES) = 202.15 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54

TOTAL AREA(ACRES) = 210.0 PEAK FLOW RATE(CFS) = 381.80

FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.80

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.261

D-13

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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RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.80 0.30 0.600 56

RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 2.00 0.30 0.500 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566

SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 10.92

EFFECTIVE AREA(ACRES) = 207.95 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54

TOTAL AREA(ACRES) = 215.8 PEAK FLOW RATE(CFS) = 392.72

FLOW PROCESS FROM NODE 409.00 TO NODE 410.00 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) = 445.00

FLOW LENGTH(FEET) = 291.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 54.0 INCH PIPE IS 41.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 30.24

ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 392.72

PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 16.96

LONGEST FLOWPATH FROM NODE 430.00 TO NODE 410.00 = 5170.00 FEET.

FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.96

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.249

D-14

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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PUBLIC PARK B 0.90 0.30 0.850 56

APARTMENTS B 1.50 0.30 0.200 56

COMMERCIAL B 0.80 0.30 0.100 56

PUBLIC PARK B 2.30 0.30 0.850 56

RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.40 0.30 0.600 56

APARTMENTS B 3.10 0.30 0.200 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456

SUBAREA AREA(ACRES) = 10.00 SUBAREA RUNOFF(CFS) = 19.01

EFFECTIVE AREA(ACRES) = 217.95 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54

TOTAL AREA(ACRES) = 225.8 PEAK FLOW RATE(CFS) = 409.57

FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.96

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.249

D-14

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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PUBLIC PARK B 1.10 0.30 0.850 56

RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56

RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 4.00 0.30 0.600 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.645

SUBAREA AREA(ACRES) = 5.20 SUBAREA RUNOFF(CFS) = 9.62

EFFECTIVE AREA(ACRES) = 223.15 AREA-AVERAGED Fm(INCH/HR) = 0.16

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54

TOTAL AREA(ACRES) = 231.0 PEAK FLOW RATE(CFS) = 419.19

FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.96

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.249 **D-14.1**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 APARTMENTS B 2.10 0.30 0.200 56
 APARTMENTS B 8.90 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 21.67
 EFFECTIVE AREA(ACRES) = 234.15 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 242.0 PEAK FLOW RATE(CFS) = 440.86

 FLOW PROCESS FROM NODE 410.00 TO NODE 411.00 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) = 425.00
 FLOW LENGTH(FEET) = 324.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 42.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 33.17
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 440.86
 PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 17.12
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 411.00 = 5494.00 FEET.

 FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 17.12 **D-15**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.237
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 APARTMENTS B 0.10 0.30 0.200 56
 COMMERCIAL B 0.20 0.30 0.100 56
 PUBLIC PARK B 1.70 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.70 0.30 0.200 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.20 0.30 0.600 56
 COMMERCIAL B 0.70 0.30 0.100 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.504
 SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 6.76
 EFFECTIVE AREA(ACRES) = 237.75 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 245.6 PEAK FLOW RATE(CFS) = 445.15

 FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 17.12 **D-15**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.237
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 0.90 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 8.80 0.30 0.200 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.20 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.267
 SUBAREA AREA(ACRES) = 9.90 SUBAREA RUNOFF(CFS) = 19.22
 EFFECTIVE AREA(ACRES) = 247.65 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 255.5 PEAK FLOW RATE(CFS) = 464.37

 FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 17.12 **D-15.1**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.237
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 APARTMENTS B 0.50 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 2.10 0.30 0.600 56
 APARTMENTS B 0.70 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.30 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.546
 SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 14.56
 EFFECTIVE AREA(ACRES) = 255.45 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
 TOTAL AREA(ACRES) = 263.3 PEAK FLOW RATE(CFS) = 478.93

 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) = 425.00 DOWNSTREAM(FEET) = 392.00
 FLOW LENGTH(FEET) = 641.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 45.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 31.45
 ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 478.93
 PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 17.46
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 412.00 = 6135.00 FEET.

FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 17.46
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.213 **D-16**
 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	5.30	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
COMMERCIAL	B	1.10	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	7.30	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.198
 SUBAREA AREA(ACRES) = 14.50 SUBAREA RUNOFF(CFS) = 28.10
 EFFECTIVE AREA(ACRES) = 269.95 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) = 277.8 PEAK FLOW RATE(CFS) = 501.41

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 17.46
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.213 **D-32**
 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	0.20	0.30	0.200	56
COMMERCIAL	B	0.20	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	4.10	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.60	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.10	0.30	0.400	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.50	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.317
 SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 16.58
 EFFECTIVE AREA(ACRES) = 278.65 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 286.5 PEAK FLOW RATE(CFS) = 517.99

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 17.46
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.213 **D-32**
 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	0.50	0.30	0.900	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	4.00	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456
 SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 8.41
 EFFECTIVE AREA(ACRES) = 283.15 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 291.0 PEAK FLOW RATE(CFS) = 526.40

FLOW PROCESS FROM NODE 412.00 TO NODE 420.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 392.00 DOWNSTREAM(FEET) = 350.00
 FLOW LENGTH(FEET) = 1358.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 66.0 INCH PIPE IS 50.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 26.81
 ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 526.40
 PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 18.30
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 420.00 = 7493.00 FEET.

FLOW PROCESS FROM NODE 420.00 TO NODE 420.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 18.30
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.152 **D-35**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.50	0.30	0.100	56
COMMERCIAL	B	1.30	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.105
 SUBAREA AREA(ACRES) = 1.90 SUBAREA RUNOFF(CFS) = 3.63
 EFFECTIVE AREA(ACRES) = 285.05 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 292.9 PEAK FLOW RATE(CFS) = 526.40
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 420.00 TO NODE 421.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 346.00 DOWNSTREAM(FEET) = 320.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1617.00 CHANNEL SLOPE = 0.0161
CHANNEL BASE(FEET) = 200.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 20.00
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.821

D-34

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	6.90	0.30	0.100	56
COMMERCIAL	B	3.60	0.30	0.100	56
COMMERCIAL	B	2.20	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.70	0.30	0.900	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.30	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.227
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 538.31
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.45
AVERAGE FLOW DEPTH(FEET) = 0.60 TRAVEL TIME(MIN.) = 6.06
Tc(MIN.) = 24.36
SUBAREA AREA(ACRES) = 15.10 SUBAREA RUNOFF(CFS) = 23.82
EFFECTIVE AREA(ACRES) = 300.15 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 308.0 PEAK FLOW RATE(CFS) = 526.40
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.59 FLOW VELOCITY(FEET/SEC.) = 4.41
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 421.00 = 9110.00 FEET.

FLOW PROCESS FROM NODE 421.00 TO NODE 421.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 24.36
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.821

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.10	0.30	0.850	56
PUBLIC PARK	B	2.50	0.30	0.850	56
PUBLIC PARK	B	3.60	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 10.14
EFFECTIVE AREA(ACRES) = 307.35 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 315.2 PEAK FLOW RATE(CFS) = 526.40
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

D-34

FLOW PROCESS FROM NODE 421.00 TO NODE 427.00 IS CODE = 31

>>>>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) = 1453.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 87.0 INCH PIPE IS 67.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.22
ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 526.40
PIPE TRAVEL TIME(MIN.) = 1.59 Tc(MIN.) = 25.95
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 25.95
RAINFALL INTENSITY(INCH/HR) = 1.75
AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.48
EFFECTIVE STREAM AREA(ACRES) = 307.35
TOTAL STREAM AREA(ACRES) = 315.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 526.40

FLOW PROCESS FROM NODE 413.00 TO NODE 414.00 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) = 515.00 DOWNSTREAM(FEET) = 497.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.533
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 4.288

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	0.10	0.30	0.100	56	5.53
PUBLIC PARK	B	1.10	0.30	0.850	56	8.79
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56	7.50
COMMERCIAL	B	0.10	0.30	0.100	56	5.53
PUBLIC PARK	B	0.30	0.30	0.850	56	8.79
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56	7.50

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.678
SUBAREA RUNOFF(CFS) = 11.76
TOTAL AREA(ACRES) = 3.20 PEAK FLOW RATE(CFS) = 11.76

D-21

FLOW PROCESS FROM NODE 414.00 TO NODE 414.10 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 497.00 DOWNSTREAM ELEVATION(FEET) = 493.00
STREET LENGTH(FEET) = 371.00 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) = 19.38

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.49

HALFSTREET FLOOD WIDTH(FEET) = 18.09

AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.11

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.51

STREET FLOW TRAVEL TIME(MIN.) = 1.99 Tc(MIN.) = 7.52

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.719

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 PUBLIC PARK, RESIDENTIAL, and "3-4 DWELLINGS/ACRE".

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.673

SUBAREA AREA(ACRES) = 4.80 SUBAREA RUNOFF(CFS) = 15.20

EFFECTIVE AREA(ACRES) = 8.00 AREA-AVERAGED Fm(INCH/HR) = 0.20

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.68

TOTAL AREA(ACRES) = 8.0 PEAK FLOW RATE(CFS) = 25.32

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.52 HALFSTREET FLOOD WIDTH(FEET) = 20.12

FLOW VELOCITY(FEET/SEC.) = 3.32 DEPTH*VELOCITY(FT*FT/SEC.) = 1.74

LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.10 = 701.00 FEET.

D-22

FLOW PROCESS FROM NODE 414.10 TO NODE 414.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 493.00 DOWNSTREAM ELEVATION(FEET) = 490.00
STREET LENGTH(FEET) = 476.00 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) = 32.44

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.60

HALFSTREET FLOOD WIDTH(FEET) = 24.65

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.89

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.74

STREET FLOW TRAVEL TIME(MIN.) = 2.75 Tc(MIN.) = 10.27

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.977

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 APARTMENTS, COMMERCIAL, RESIDENTIAL, and "3-4 DWELLINGS/ACRE".

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.512

SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 14.23

EFFECTIVE AREA(ACRES) = 13.60 AREA-AVERAGED Fm(INCH/HR) = 0.18

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.61

TOTAL AREA(ACRES) = 13.6 PEAK FLOW RATE(CFS) = 34.20

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.61 HALFSTREET FLOOD WIDTH(FEET) = 25.20

FLOW VELOCITY(FEET/SEC.) = 2.92 DEPTH*VELOCITY(FT*FT/SEC.) = 1.79

LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.20 = 1177.00 FEET.

D-23

FLOW PROCESS FROM NODE 414.20 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) = 490.00 DOWNSTREAM(FEET) = 465.00

FLOW LENGTH(FEET) = 488.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.9 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 16.75

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 34.20

PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 10.75

LONGEST FLOWPATH FROM NODE 413.00 TO NODE 415.00 = 1665.00 FEET.

FLOW PROCESS FROM NODE 415.00 TO NODE 415.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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=====
MAINLINE Tc(MIN.) = 10.75
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.917
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"    B        0.10    0.30    0.900   56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        2.30    0.30    0.600   56
APARTMENTS           B        0.10    0.30    0.200   56
COMMERCIAL            B        0.80    0.30    0.100   56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        3.20    0.30    0.600   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.537
SUBAREA AREA(ACRES) = 6.50    SUBAREA RUNOFF(CFS) = 16.12
EFFECTIVE AREA(ACRES) = 20.10 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.59
TOTAL AREA(ACRES) = 20.1    PEAK FLOW RATE(CFS) = 49.59

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D-24

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FLOW PROCESS FROM NODE 415.00 TO NODE 416.00 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) = 465.00 DOWNSTREAM(FEET) = 440.00
FLOW LENGTH(FEET) = 497.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 17.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.20
ESTIMATED PIPE DIAMETER(INCH) = 27.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 49.59
PIPE TRAVEL TIME(MIN.) = 0.46    Tc(MIN.) = 11.21
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 416.00 = 2162.00 FEET.

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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.) = 11.21
* 15 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
COMMERCIAL            B        0.80    0.30    0.100   56
RESIDENTIAL
".4 DWELLING/ACRE"    B        0.40    0.30    0.900   56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B        3.70    0.30    0.400   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.392
SUBAREA AREA(ACRES) = 4.90    SUBAREA RUNOFF(CFS) = 12.09
EFFECTIVE AREA(ACRES) = 25.00 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 25.0    PEAK FLOW RATE(CFS) = 60.66

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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.) = 11.21
* 15 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
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        1.80    0.30    0.200   56
RESIDENTIAL
".4 DWELLING/ACRE"    B        0.10    0.30    0.900   56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        1.60    0.30    0.600   56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        3.60    0.30    0.200   56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B        3.00    0.30    0.600   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.389
SUBAREA AREA(ACRES) = 10.10    SUBAREA RUNOFF(CFS) = 24.94
EFFECTIVE AREA(ACRES) = 35.10 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 35.1    PEAK FLOW RATE(CFS) = 85.60

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D-25

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FLOW PROCESS FROM NODE 416.00 TO NODE 417.00 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) = 420.00
FLOW LENGTH(FEET) = 437.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.07
ESTIMATED PIPE DIAMETER(INCH) = 33.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 85.60
PIPE TRAVEL TIME(MIN.) = 0.36    Tc(MIN.) = 11.57
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 417.00 = 2599.00 FEET.

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FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 11.57
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.815
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        1.50    0.30    0.200   56
COMMERCIAL            B        0.70    0.30    0.100   56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B        3.40    0.30    0.200   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

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D-27

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.188
SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 13.90
EFFECTIVE AREA (ACRES) = 40.70 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
TOTAL AREA (ACRES) = 40.7 PEAK FLOW RATE (CFS) = 98.08

FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 11.57
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.815 **D-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 4.60 0.30 0.100 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 4.00 0.30 0.200 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
COMMERCIAL B 1.50 0.30 0.100 56
PUBLIC PARK B 2.10 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 1.60 0.30 0.200 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.264
SUBAREA AREA (ACRES) = 14.00 SUBAREA RUNOFF (CFS) = 34.47
EFFECTIVE AREA (ACRES) = 54.70 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA (ACRES) = 54.7 PEAK FLOW RATE (CFS) = 132.55

FLOW PROCESS FROM NODE 417.00 TO NODE 418.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM (FEET) = 420.00 DOWNSTREAM (FEET) = 400.00
FLOW LENGTH (FEET) = 619.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 30.1 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 19.30
ESTIMATED PIPE DIAMETER (INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 132.55
PIPE TRAVEL TIME (MIN.) = 0.53 Tc (MIN.) = 12.11
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 418.00 = 3218.00 FEET.

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 12.11
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.749 **D-30**
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.70 0.30 0.100 56

COMMERCIAL B 2.10 0.30 0.100 56
COMMERCIAL B 3.90 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 5.50 0.30 0.500 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 3.20 0.30 0.500 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.333
SUBAREA AREA (ACRES) = 15.60 SUBAREA RUNOFF (CFS) = 37.19
EFFECTIVE AREA (ACRES) = 70.30 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA (ACRES) = 70.3 PEAK FLOW RATE (CFS) = 166.48

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 12.11
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.749 **D-30**
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" B 0.30 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.40 0.30 0.400 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 3.10 0.30 0.400 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 0.20 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
SUBAREA AREA (ACRES) = 4.00 SUBAREA RUNOFF (CFS) = 9.46
EFFECTIVE AREA (ACRES) = 74.30 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA (ACRES) = 74.3 PEAK FLOW RATE (CFS) = 175.94

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 12.11
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.749 **D-29**
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
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 2.20 0.30 0.200 56
COMMERCIAL B 3.70 0.30 0.100 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 3.50 0.30 0.200 56
COMMERCIAL B 0.70 0.30 0.100 56
RESIDENTIAL

"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.154
 SUBAREA AREA(ACRES) = 10.80 SUBAREA RUNOFF(CFS) = 26.27
 EFFECTIVE AREA(ACRES) = 85.10 AREA-AVERAGED Fm(INCH/HR) = 0.11
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
 TOTAL AREA(ACRES) = 85.1 PEAK FLOW RATE(CFS) = 202.21

 FLOW PROCESS FROM NODE 418.00 TO NODE 425.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 320.00
 FLOW LENGTH(FEET) = 1179.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 28.04
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 202.21
 PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 12.81
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 425.00 = 4397.00 FEET.

 FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 12.81 **D-33**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.662
 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	B	0.40	0.30	0.100	56
COMMERCIAL	B	0.90	0.30	0.100	56
PUBLIC PARK	B	5.30	0.30	0.850	56
PUBLIC PARK	B	3.10	0.30	0.850	56
PUBLIC PARK	B	9.10	0.30	0.850	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.777
 SUBAREA AREA(ACRES) = 19.40 SUBAREA RUNOFF(CFS) = 42.41
 EFFECTIVE AREA(ACRES) = 104.50 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
 TOTAL AREA(ACRES) = 104.5 PEAK FLOW RATE(CFS) = 237.96

 FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 12.81 **D-33**
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.662
 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	1.30	0.30	0.900	56

RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.90 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.90 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 10.98
 EFFECTIVE AREA(ACRES) = 109.60 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 109.6 PEAK FLOW RATE(CFS) = 248.94

 FLOW PROCESS FROM NODE 425.00 TO NODE 426.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 320.00 DOWNSTREAM(FEET) = 316.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 870.00 CHANNEL SLOPE = 0.0046
 GIVEN CHANNEL BASE(FEET) = 200.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.57
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.091 **D-36**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.40	0.30	0.100	56
COMMERCIAL	B	3.30	0.30	0.100	56
PUBLIC PARK	B	0.80	0.30	0.850	56
PUBLIC PARK	B	0.30	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.90	0.30	0.900	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	2.30	0.30	0.900	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.408
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 258.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.28
 AVERAGE FLOW DEPTH(FEET) = 0.56 TRAVEL TIME(MIN.) = 6.35
 Tc(MIN.) = 19.16
 SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 19.49
 EFFECTIVE AREA(ACRES) = 120.60 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 120.6 PEAK FLOW RATE(CFS) = 248.94
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
 GIVEN CHANNEL BASE(FEET) = 200.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.55

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55 FLOW VELOCITY(FEET/SEC.) = 2.24
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 426.00 = 5267.00 FEET.

 FLOW PROCESS FROM NODE 426.00 TO NODE 426.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 19.16
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.091
 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
RESIDENTIAL ".4 DWELLING/ACRE"	B	1.70	0.30	0.900	56
PUBLIC PARK	B	0.50	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.569
 SUBAREA AREA(ACRES) = 3.70 SUBAREA RUNOFF(CFS) = 6.39
 EFFECTIVE AREA(ACRES) = 124.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 124.3 PEAK FLOW RATE(CFS) = 248.94
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

D-37

 FLOW PROCESS FROM NODE 426.00 TO NODE 427.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 316.00 DOWNSTREAM(FEET) = 310.00
 FLOW LENGTH(FEET) = 321.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 54.0 INCH PIPE IS 43.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.28
 ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 248.94
 PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 19.45
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 427.00 = 5588.00 FEET.

 FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 19.45
 RAINFALL INTENSITY(INCH/HR) = 2.07
 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.46
 EFFECTIVE STREAM AREA(ACRES) = 124.30
 TOTAL STREAM AREA(ACRES) = 124.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 248.94

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	526.40	25.95	1.754	0.30(0.15)	0.48	307.4	430.00
1	509.23	27.74	1.686	0.30(0.15)	0.49	315.2	400.00
2	248.94	19.45	2.070	0.30(0.14)	0.46	124.3	413.00

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	720.88	19.45	2.070	0.30(0.14)	0.48	354.6	413.00
2	734.63	25.95	1.754	0.30(0.14)	0.48	431.7	430.00
3	708.70	27.74	1.686	0.30(0.14)	0.48	439.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 734.63 Tc(MIN.) = 25.95
 EFFECTIVE AREA(ACRES) = 431.65 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 439.5
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

 FLOW PROCESS FROM NODE 427.00 TO NODE 428.00 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) = 275.00
 FLOW LENGTH(FEET) = 789.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 69.0 INCH PIPE IS 54.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 33.15
 ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 734.63
 PIPE TRAVEL TIME(MIN.) = 0.40 Tc(MIN.) = 26.35
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 428.00 = 11352.00 FEET.

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 439.5 TC(MIN.) = 26.35
 EFFECTIVE AREA(ACRES) = 431.65 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.477
 PEAK FLOW RATE(CFS) = 734.63

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	720.88	19.85	2.041	0.30(0.14)	0.48	354.6	413.00
2	734.63	26.35	1.739	0.30(0.14)	0.48	431.7	430.00
3	708.70	28.14	1.671	0.30(0.14)	0.48	439.5	400.00

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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92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA D ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 100-YR EV SEPTEMBER 2018 CCHI *

FILE NAME: PA3D00EV.DAT
TIME/DATE OF STUDY: 11:51 09/25/2018

=====

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) (FT)	MANNING HIKE (FT) (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 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) = 330.00
ELEVATION DATA: UPSTREAM(FEET) = 605.00 DOWNSTREAM(FEET) = 586.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.417
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.859

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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"	B	1.20	0.30	0.900	56	8.77
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.30	0.30	0.600	56	7.42
PUBLIC PARK	B	2.40	0.30	0.850	56	8.70

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.796
SUBAREA RUNOFF(CFS) = 15.96
TOTAL AREA(ACRES) = 4.90 PEAK FLOW RATE(CFS) = 15.96

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) = 586.00 DOWNSTREAM ELEVATION(FEET) = 583.00
STREET LENGTH(FEET) = 333.00 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) = 26.36
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.54
HALFSTREET FLOOD WIDTH(FEET) = 21.21
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.13
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.69
STREET FLOW TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 9.19
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.418

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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"	B	0.10	0.30	0.900	56
PUBLIC PARK	B	0.40	0.30	0.850	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	1.90	0.30	0.400	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	4.70	0.30	0.600	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.565
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 20.76
EFFECTIVE AREA(ACRES) = 12.00 AREA-AVERAGED Fm(INCH/HR) = 0.20

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.66
TOTAL AREA (ACRES) = 12.0 PEAK FLOW RATE (CFS) = 34.78

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.58 HALFSTREET FLOOD WIDTH (FEET) = 23.63
FLOW VELOCITY (FEET/SEC.) = 3.36 DEPTH*VELOCITY (FT*FT/SEC.) = 1.96
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.00 = 663.00 FEET.

FLOW PROCESS FROM NODE 402.00 TO NODE 402.50 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 583.00 DOWNSTREAM ELEVATION (FEET) = 580.00
STREET LENGTH (FEET) = 315.00 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) = 41.09

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.61
HALFSTREET FLOOD WIDTH (FEET) = 24.96
AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.57
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 2.17
STREET FLOW TRAVEL TIME (MIN.) = 1.47 Tc (MIN.) = 10.66
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.142

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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
PUBLIC PARK	B	0.50	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.80	0.30	0.600	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	0.10	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 12.62
EFFECTIVE AREA (ACRES) = 16.70 AREA-AVERAGED Fm (INCH/HR) = 0.19
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.62
TOTAL AREA (ACRES) = 16.7 PEAK FLOW RATE (CFS) = 44.42

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.62 HALFSTREET FLOOD WIDTH (FEET) = 25.74
FLOW VELOCITY (FEET/SEC.) = 3.63 DEPTH*VELOCITY (FT*FT/SEC.) = 2.26
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 402.50 = 978.00 FEET.

FLOW PROCESS FROM NODE 402.50 TO NODE 403.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 580.00 DOWNSTREAM ELEVATION (FEET) = 579.00
STREET LENGTH (FEET) = 394.00 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) = 48.08

STREET FLOWING FULL

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.76
HALFSTREET FLOOD WIDTH (FEET) = 34.67
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.33
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.77
STREET FLOW TRAVEL TIME (MIN.) = 2.81 Tc (MIN.) = 13.47
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.752

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.20	0.30	0.850	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	2.80	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.435
SUBAREA AREA (ACRES) = 3.10 SUBAREA RUNOFF (CFS) = 7.31
EFFECTIVE AREA (ACRES) = 19.80 AREA-AVERAGED Fm (INCH/HR) = 0.18
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.59
TOTAL AREA (ACRES) = 19.8 PEAK FLOW RATE (CFS) = 45.88

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END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.75 HALFSTREET FLOOD WIDTH (FEET) = 34.18
FLOW VELOCITY (FEET/SEC.) = 2.30 DEPTH*VELOCITY (FT*FT/SEC.) = 1.73
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 403.00 = 1372.00 FEET.

FLOW PROCESS FROM NODE 403.00 TO NODE 404.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION (FEET) = 579.00 DOWNSTREAM ELEVATION (FEET) = 560.00
STREET LENGTH (FEET) = 974.00 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) = 55.11
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.60
 HALFSTREET FLOOD WIDTH(FEET) = 24.34
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.03
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.00
 STREET FLOW TRAVEL TIME(MIN.) = 3.23 Tc(MIN.) = 16.70
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437

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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	B	5.80	0.30	0.100	56
COMMERCIAL	B	0.70	0.30	0.100	56
PUBLIC PARK	B	1.10	0.30	0.850	56
PUBLIC PARK	B	0.70	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.30	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.267
 SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 18.46
 EFFECTIVE AREA(ACRES) = 28.50 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.49
 TOTAL AREA(ACRES) = 28.5 PEAK FLOW RATE(CFS) = 58.72

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.61 HALFSTREET FLOOD WIDTH(FEET) = 24.96
 FLOW VELOCITY(FEET/SEC.) = 5.10 DEPTH*VELOCITY(FT*FT/SEC.) = 3.10
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 404.00 = 2346.00 FEET.

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 16.70
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437
 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
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.30	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.70	0.30	0.500	56
RESIDENTIAL					

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"8-10 DWELLINGS/ACRE"	B	3.40	0.30	0.400	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	5.30	0.30	0.200	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.432					
SUBAREA AREA(ACRES) = 13.90			SUBAREA RUNOFF(CFS) = 28.87		
EFFECTIVE AREA(ACRES) = 42.40			AREA-AVERAGED Fm(INCH/HR) = 0.14		
AREA-AVERAGED Fp(INCH/HR) = 0.30			AREA-AVERAGED Ap = 0.47		
TOTAL AREA(ACRES) = 42.4			PEAK FLOW RATE(CFS) = 87.58		

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 16.70
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437
 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	0.20	0.30	0.900	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900					
SUBAREA AREA(ACRES) = 0.20			SUBAREA RUNOFF(CFS) = 0.39		
EFFECTIVE AREA(ACRES) = 42.60			AREA-AVERAGED Fm(INCH/HR) = 0.14		
AREA-AVERAGED Fp(INCH/HR) = 0.30			AREA-AVERAGED Ap = 0.47		
TOTAL AREA(ACRES) = 42.6			PEAK FLOW RATE(CFS) = 87.97		

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 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 16.70
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56
PUBLIC PARK	B	1.50	0.30	0.850	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	2.50	0.30	0.500	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.590					
SUBAREA AREA(ACRES) = 4.50			SUBAREA RUNOFF(CFS) = 9.15		
EFFECTIVE AREA(ACRES) = 47.10			AREA-AVERAGED Fm(INCH/HR) = 0.15		
AREA-AVERAGED Fp(INCH/HR) = 0.30			AREA-AVERAGED Ap = 0.49		
TOTAL AREA(ACRES) = 47.1			PEAK FLOW RATE(CFS) = 97.13		

 FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 81

=====
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

MAINLINE Tc(MIN.) = 16.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	2.80	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	3.00	0.30	0.900	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	6.40	0.30	0.500	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	6.70	0.30	0.600	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	4.30	0.30	0.900	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	8.70	0.30	0.600	56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.671
SUBAREA AREA(ACRES) = 31.90 SUBAREA RUNOFF(CFS) = 64.19
EFFECTIVE AREA(ACRES) = 79.00 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.56
TOTAL AREA(ACRES) = 79.0 PEAK FLOW RATE(CFS) = 161.32

D-6

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 16.70
RAINFALL INTENSITY(INCH/HR) = 2.44
AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.56
EFFECTIVE STREAM AREA(ACRES) = 79.00
TOTAL STREAM AREA(ACRES) = 79.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 161.32

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) = 729.00 DOWNSTREAM(FEET) = 630.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.120
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.433
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						

OD-1

"CHAPARRAL,NARROWLEAF"	B	0.10	0.30	1.000	72	9.12
NATURAL FAIR COVER						
"OPEN BRUSH"	B	1.30	0.30	1.000	66	9.12
NATURAL FAIR COVER						
"OPEN BRUSH"	B	0.10	0.30	1.000	66	9.12

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 4.23
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 4.23

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) = 3.330

OD-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"	B	1.70	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,NARROWLEAF"	B	0.10	0.30	1.000	72
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.10	0.30	1.000	66

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.82
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.52
AVERAGE FLOW DEPTH(FEET) = 0.59 TRAVEL TIME(MIN.) = 0.50
Tc(MIN.) = 9.62
SUBAREA AREA(ACRES) = 1.90 SUBAREA RUNOFF(CFS) = 5.18
EFFECTIVE AREA(ACRES) = 3.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.4 PEAK FLOW RATE(CFS) = 9.27

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.66 FLOW VELOCITY(FEET/SEC.) = 7.08
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) = 570.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 243.00 CHANNEL SLOPE = 0.1111
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) = 3.220
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					

OD-3

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
NATURAL FAIR COVER
"OPEN BRUSH" B 3.80 0.30 1.000 66
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.30 0.30 1.000 65
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" B 0.10 0.30 1.000 72
NATURAL FAIR COVER
"OPEN BRUSH" B 0.20 0.30 1.000 66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 15.19
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.86
AVERAGE FLOW DEPTH(FEET) = 0.86 TRAVEL TIME(MIN.) = 0.59
Tc(MIN.) = 10.21
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 11.83
EFFECTIVE AREA(ACRES) = 7.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 7.9 PEAK FLOW RATE(CFS) = 20.76

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.97 FLOW VELOCITY(FEET/SEC.) = 7.42
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.00 = 768.00 FEET.

FLOW PROCESS FROM NODE 433.00 TO NODE 433.10 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) = 564.00
FLOW LENGTH(FEET) = 1076.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.28
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.76
PIPE TRAVEL TIME(MIN.) = 2.86 Tc(MIN.) = 13.07
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 433.10 = 1844.00 FEET.

FLOW PROCESS FROM NODE 433.10 TO NODE 433.10 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

MAINLINE Tc(MIN.) = 13.07
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.800

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

PUBLIC PARK B 0.50 0.30 0.850 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.70 0.30 0.900 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 5.40 0.30 0.500 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.613

D-8

SUBAREA AREA(ACRES) = 7.60 SUBAREA RUNOFF(CFS) = 17.90
EFFECTIVE AREA(ACRES) = 15.50 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.81
TOTAL AREA(ACRES) = 15.5 PEAK FLOW RATE(CFS) = 35.68

FLOW PROCESS FROM NODE 433.10 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) = 564.00 DOWNSTREAM(FEET) = 560.00
FLOW LENGTH(FEET) = 830.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.92
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 35.68
PIPE TRAVEL TIME(MIN.) = 2.00 Tc(MIN.) = 15.07
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

FLOW PROCESS FROM NODE 404.00 TO NODE 404.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.07
RAINFALL INTENSITY(INCH/HR) = 2.58
AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.81
EFFECTIVE STREAM AREA(ACRES) = 15.50
TOTAL STREAM AREA(ACRES) = 15.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.68

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	161.32	16.70	2.437	0.30(0.17)	0.56	79.0	400.00
2	35.68	15.07	2.584	0.30(0.24)	0.81	15.5	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	190.58	15.07	2.584	0.30(0.18)	0.60	86.8	430.00
2	194.77	16.70	2.437	0.30(0.18)	0.60	94.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 194.77 Tc(MIN.) = 16.70
EFFECTIVE AREA(ACRES) = 94.50 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 94.5
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 404.00 = 2674.00 FEET.

```
*****
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) = 560.00 DOWNSTREAM(FEET) = 557.00
FLOW LENGTH(FEET) = 377.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 43.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.67
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 194.77
PIPE TRAVEL TIME(MIN.) = 0.50 Tc(MIN.) = 17.20
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 405.00 = 3051.00 FEET.
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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
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```
MAINLINE Tc(MIN.) = 17.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.397
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 1.30 0.30 0.100 56
PUBLIC PARK B 0.90 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.20 0.30 0.200 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 4.50 0.30 0.500 56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B 3.20 0.30 0.400 56
COMMERCIAL B 1.20 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.406
SUBAREA AREA(ACRES) = 11.30 SUBAREA RUNOFF(CFS) = 23.14
EFFECTIVE AREA(ACRES) = 105.80 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.58
TOTAL AREA(ACRES) = 105.8 PEAK FLOW RATE(CFS) = 211.67
```

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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
```

```
MAINLINE Tc(MIN.) = 17.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.397
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 0.20 0.30 0.850 56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
RESIDENTIAL
"5-7 DWELLINGS/ACRE" B 4.20 0.30 0.500 56
RESIDENTIAL
```

```
"8-10 DWELLINGS/ACRE" B 3.80 0.30 0.400 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.459
SUBAREA AREA(ACRES) = 8.30 SUBAREA RUNOFF(CFS) = 16.88
EFFECTIVE AREA(ACRES) = 114.10 AREA-AVERAGED Fm(INCH/HR) = 0.17
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.57
TOTAL AREA(ACRES) = 114.1 PEAK FLOW RATE(CFS) = 228.55
```

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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81
-----
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```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.397
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	4.80	0.30	0.200	56
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	5.20	0.30	0.400	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.307					
SUBAREA AREA(ACRES) = 10.10 SUBAREA RUNOFF(CFS) = 20.95					
EFFECTIVE AREA(ACRES) = 124.20 AREA-AVERAGED Fm(INCH/HR) = 0.17					
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.55					
TOTAL AREA(ACRES) = 124.2 PEAK FLOW RATE(CFS) = 249.50					

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*****
FLOW PROCESS FROM NODE 405.00 TO NODE 406.00 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) = 557.00 DOWNSTREAM(FEET) = 535.00
FLOW LENGTH(FEET) = 525.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.10
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 249.50
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 17.55
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 406.00 = 3576.00 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.) = 17.55
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.370
```

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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" B 0.30 0.30 0.900 56
```

PUBLIC PARK B 0.90 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 8.70 0.30 0.200 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 0.10 0.30 0.600 56
 PUBLIC PARK B 0.40 0.30 0.850 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.311
 SUBAREA AREA (ACRES) = 10.50 SUBAREA RUNOFF (CFS) = 21.52
 EFFECTIVE AREA (ACRES) = 134.70 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
 TOTAL AREA (ACRES) = 134.7 PEAK FLOW RATE (CFS) = 267.99

 FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 17.55
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.370 **D-10**
 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 9.00 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA (ACRES) = 9.00 SUBAREA RUNOFF (CFS) = 18.71
 EFFECTIVE AREA (ACRES) = 143.70 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
 TOTAL AREA (ACRES) = 143.7 PEAK FLOW RATE (CFS) = 286.70

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	287.75	15.92	2.504	0.30 (0.15)	0.51	136.0	430.00
2	286.70	17.55	2.370	0.30 (0.15)	0.51	143.7	400.00

NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE (CFS) = 287.75 Tc (MIN.) = 15.92
 AREA-AVERAGED Fm (INCH/HR) = 0.15 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.51 EFFECTIVE AREA (ACRES) = 135.95

 FLOW PROCESS FROM NODE 406.00 TO NODE 406.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 15.92
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.504 **D-11**
 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" B 0.30 0.30 0.600 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.50 0.30 0.900 56

RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 18.70 0.30 0.600 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 1.00 0.30 0.600 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.609
 SUBAREA AREA (ACRES) = 20.60 SUBAREA RUNOFF (CFS) = 43.04
 EFFECTIVE AREA (ACRES) = 156.55 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA (ACRES) = 164.3 PEAK FLOW RATE (CFS) = 330.79

 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) = 535.00 DOWNSTREAM (FEET) = 510.00
 FLOW LENGTH (FEET) = 311.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 34.2 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 34.55
 ESTIMATED PIPE DIAMETER (INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 330.79
 PIPE TRAVEL TIME (MIN.) = 0.15 Tc (MIN.) = 16.07
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 407.00 = 3887.00 FEET.

 FLOW PROCESS FROM NODE 407.00 TO NODE 407.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 16.07
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.491 **D-11.1**
 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" B 0.10 0.30 0.500 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.10 0.30 0.900 56
 COMMERCIAL B 2.20 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.40 0.30 0.900 56
 COMMERCIAL B 1.10 0.30 0.100 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.353
 SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 10.52
 EFFECTIVE AREA (ACRES) = 161.45 AREA-AVERAGED Fm (INCH/HR) = 0.15
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA (ACRES) = 169.2 PEAK FLOW RATE (CFS) = 339.44

 FLOW PROCESS FROM NODE 407.00 TO NODE 408.00 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) = 510.00 DOWNSTREAM(FEET) = 480.00
FLOW LENGTH(FEET) = 624.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 40.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.20
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 339.44
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 16.44
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 408.00 = 4511.00 FEET.

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*****
FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 16.44
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.459 D-12
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	0.70	0.30	0.900	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	1.60	0.30	0.600	56
COMMERCIAL	B	1.40	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	4.80	0.30	0.900	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	4.20	0.30	0.600	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	2.20	0.30	0.500	56

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.649
SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 30.37
EFFECTIVE AREA(ACRES) = 176.35 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 184.1 PEAK FLOW RATE(CFS) = 365.19

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*****
FLOW PROCESS FROM NODE 408.00 TO NODE 408.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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```

MAINLINE Tc(MIN.) = 16.44
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.459 D-12
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
RESIDENTIAL ".4 DWELLING/ACRE"	B	2.10	0.30	0.900	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	6.60	0.30	0.600	56
RESIDENTIAL "5-7 DWELLINGS/ACRE"	B	2.00	0.30	0.500	56

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.625
SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 22.49

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EFFECTIVE AREA(ACRES) = 187.35 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 195.1 PEAK FLOW RATE(CFS) = 387.68

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*****
FLOW PROCESS FROM NODE 408.00 TO NODE 409.00 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) = 480.00 DOWNSTREAM(FEET) = 460.00
FLOW LENGTH(FEET) = 368.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 39.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.91
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 387.68
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 16.64
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 409.00 = 4879.00 FEET.

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FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 16.64
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.442 D-13
SUBAREA LOSS RATE DATA(AMC II):

```

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	0.70	0.30	0.850	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.30	0.30	0.900	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	2.20	0.30	0.600	56
APARTMENTS	B	0.20	0.30	0.200	56
COMMERCIAL	B	0.60	0.30	0.100	56
PUBLIC PARK	B	1.80	0.30	0.850	56

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.658
SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 11.72
EFFECTIVE AREA(ACRES) = 193.15 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
TOTAL AREA(ACRES) = 200.9 PEAK FLOW RATE(CFS) = 396.59

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*****
FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 16.64
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.442 D-13
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	1.20	0.30	0.900	56
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	2.90	0.30	0.600	56

RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 3.30 0.30 0.500 56
 APARTMENTS B 0.10 0.30 0.200 56
 COMMERCIAL B 0.40 0.30 0.100 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.20 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.616
 SUBAREA AREA (ACRES) = 9.10 SUBAREA RUNOFF (CFS) = 18.49
 EFFECTIVE AREA (ACRES) = 202.25 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 210.0 PEAK FLOW RATE (CFS) = 415.08

 FLOW PROCESS FROM NODE 409.00 TO NODE 409.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 16.64
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.442 **D-13**
 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" B 3.80 0.30 0.600 56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" B 2.00 0.30 0.500 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.566
 SUBAREA AREA (ACRES) = 5.80 SUBAREA RUNOFF (CFS) = 11.86
 EFFECTIVE AREA (ACRES) = 208.05 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 215.8 PEAK FLOW RATE (CFS) = 426.94

 FLOW PROCESS FROM NODE 409.00 TO NODE 410.00 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) = 445.00
 FLOW LENGTH (FEET) = 291.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.2 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 31.12
 ESTIMATED PIPE DIAMETER (INCH) = 57.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 426.94
 PIPE TRAVEL TIME (MIN.) = 0.16 Tc (MIN.) = 16.80
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 410.00 = 5170.00 FEET.

 FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 16.80
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.430
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN **D-14**
 PUBLIC PARK B 0.90 0.30 0.850 56
 APARTMENTS B 1.50 0.30 0.200 56
 COMMERCIAL B 0.80 0.30 0.100 56
 PUBLIC PARK B 2.30 0.30 0.850 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 1.40 0.30 0.600 56
 APARTMENTS B 3.10 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456
 SUBAREA AREA (ACRES) = 10.00 SUBAREA RUNOFF (CFS) = 20.63
 EFFECTIVE AREA (ACRES) = 218.05 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 225.8 PEAK FLOW RATE (CFS) = 445.17

 FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 16.80
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.430 **D-14**
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 PUBLIC PARK B 1.10 0.30 0.850 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 0.10 0.30 0.200 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 4.00 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.645
 SUBAREA AREA (ACRES) = 5.20 SUBAREA RUNOFF (CFS) = 10.46
 EFFECTIVE AREA (ACRES) = 223.25 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.54
 TOTAL AREA (ACRES) = 231.0 PEAK FLOW RATE (CFS) = 455.63

 FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc (MIN.) = 16.80
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.430 **D-14.1**
 SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 APARTMENTS B 2.10 0.30 0.200 56
 APARTMENTS B 8.90 0.30 0.200 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA (ACRES) = 11.00 SUBAREA RUNOFF (CFS) = 23.46
 EFFECTIVE AREA (ACRES) = 234.25 AREA-AVERAGED Fm (INCH/HR) = 0.16
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
 TOTAL AREA (ACRES) = 242.0 PEAK FLOW RATE (CFS) = 479.09

 FLOW PROCESS FROM NODE 410.00 TO NODE 411.00 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) = 445.00 DOWNSTREAM(FEET) = 425.00
FLOW LENGTH(FEET) = 324.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 34.17
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 479.09
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 16.95
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 411.00 = 5494.00 FEET.

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*****
FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.95
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.417
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
  LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS           B      0.10   0.30   0.200  56
COMMERCIAL           B      0.20   0.30   0.100  56
PUBLIC PARK          B      1.70   0.30   0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      0.70   0.30   0.200  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B      0.20   0.30   0.600  56
COMMERCIAL           B      0.70   0.30   0.100  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.504
SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 7.34
EFFECTIVE AREA(ACRES) = 237.85 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 245.6 PEAK FLOW RATE(CFS) = 483.73

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*****
FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.95
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.417
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
  LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK          B      0.90   0.30   0.850  56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      8.80   0.30   0.200  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B      0.20   0.30   0.600  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.267
SUBAREA AREA(ACRES) = 9.90 SUBAREA RUNOFF(CFS) = 20.82
EFFECTIVE AREA(ACRES) = 247.75 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51

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TOTAL AREA(ACRES) = 255.5 PEAK FLOW RATE(CFS) = 504.54

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*****
FLOW PROCESS FROM NODE 411.00 TO NODE 411.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.95
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.417
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
  LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS           B      0.50   0.30   0.200  56
RESIDENTIAL
".4 DWELLING/ACRE"   B      0.10   0.30   0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B      2.10   0.30   0.600  56
APARTMENTS           B      0.70   0.30   0.200  56
RESIDENTIAL
".4 DWELLING/ACRE"   B      0.10   0.30   0.900  56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B      4.30   0.30   0.600  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.546
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 15.82
EFFECTIVE AREA(ACRES) = 255.55 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.51
TOTAL AREA(ACRES) = 263.3 PEAK FLOW RATE(CFS) = 520.36

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*****
FLOW PROCESS FROM NODE 411.00 TO NODE 412.00 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) = 425.00 DOWNSTREAM(FEET) = 392.00
FLOW LENGTH(FEET) = 641.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 45.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 32.42
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 520.36
PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 17.28
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 412.00 = 6135.00 FEET.

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*****
FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 17.28
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.391
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
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      5.30   0.30   0.200  56
RESIDENTIAL

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".4 DWELLING/ACRE"      B      0.10   0.30   0.900   56
COMMERCIAL              B      1.10   0.30   0.100   56
RESIDENTIAL
"11+ DWELLINGS/ACRE"   B      7.30   0.30   0.200   56
RESIDENTIAL
".4 DWELLING/ACRE"      B      0.10   0.30   0.900   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.198
SUBAREA AREA(ACRES) = 14.50   SUBAREA RUNOFF(CFS) = 30.42
EFFECTIVE AREA(ACRES) = 270.05   AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.50
TOTAL AREA(ACRES) = 277.8   PEAK FLOW RATE(CFS) = 544.76

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*****
FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 17.28
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.391
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      0.20   0.30   0.200   56
COMMERCIAL          B      0.20   0.30   0.100   56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      4.10   0.30   0.200   56
RESIDENTIAL
".4 DWELLING/ACRE"   B      0.60   0.30   0.900   56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B     3.10   0.30   0.400   56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      0.50   0.30   0.200   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.317
SUBAREA AREA(ACRES) = 8.70   SUBAREA RUNOFF(CFS) = 17.97
EFFECTIVE AREA(ACRES) = 278.75   AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 286.5   PEAK FLOW RATE(CFS) = 562.73

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*****
FLOW PROCESS FROM NODE 412.00 TO NODE 412.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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```

MAINLINE Tc(MIN.) = 17.28
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.391
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"   B      0.50   0.30   0.900   56
RESIDENTIAL
"8-10 DWELLINGS/ACRE" B     4.00   0.30   0.400   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.456
SUBAREA AREA(ACRES) = 4.50   SUBAREA RUNOFF(CFS) = 9.13

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EFFECTIVE AREA(ACRES) = 283.25   AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 291.0   PEAK FLOW RATE(CFS) = 571.86

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*****
FLOW PROCESS FROM NODE 412.00 TO NODE 420.00 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) = 392.00   DOWNSTREAM(FEET) = 350.00
FLOW LENGTH(FEET) = 1358.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 51.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.51
ESTIMATED PIPE DIAMETER(INCH) = 69.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 571.86
PIPE TRAVEL TIME(MIN.) = 0.82   Tc(MIN.) = 18.11
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 420.00 = 7493.00 FEET.

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*****
FLOW PROCESS FROM NODE 420.00 TO NODE 420.00 IS CODE = 81
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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 18.11
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.328
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B      0.50   0.30   0.100   56
COMMERCIAL          B      1.30   0.30   0.100   56
RESIDENTIAL
"11+ DWELLINGS/ACRE" B      0.10   0.30   0.200   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.105
SUBAREA AREA(ACRES) = 1.90   SUBAREA RUNOFF(CFS) = 3.93
EFFECTIVE AREA(ACRES) = 285.15   AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.49
TOTAL AREA(ACRES) = 292.9   PEAK FLOW RATE(CFS) = 571.86
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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*****
FLOW PROCESS FROM NODE 420.00 TO NODE 421.00 IS CODE = 51
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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 346.00   DOWNSTREAM(FEET) = 320.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1617.00   CHANNEL SLOPE = 0.0161
CHANNEL BASE(FEET) = 200.00   "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.987
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA      Fp        Ap      SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B      6.90   0.30   0.100   56
COMMERCIAL          B      3.60   0.30   0.100   56
COMMERCIAL          B      2.20   0.30   0.100   56

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RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.70 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.40 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 1.30 0.30 0.900 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.227
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 584.90
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.60
 AVERAGE FLOW DEPTH(FEET) = 0.63 TRAVEL TIME(MIN.) = 5.86
 Tc(MIN.) = 23.97
 SUBAREA AREA(ACRES) = 15.10 SUBAREA RUNOFF(CFS) = 26.07
 EFFECTIVE AREA(ACRES) = 300.25 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 308.0 PEAK FLOW RATE(CFS) = 571.86
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.62 FLOW VELOCITY(FEET/SEC.) = 4.55
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 421.00 = 9110.00 FEET.

 FLOW PROCESS FROM NODE 421.00 TO NODE 421.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 23.97
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.987
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
PUBLIC PARK	B	1.10	0.30	0.850	56
PUBLIC PARK	B	2.50	0.30	0.850	56
PUBLIC PARK	B	3.60	0.30	0.850	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
 SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 11.22
 EFFECTIVE AREA(ACRES) = 307.45 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
 TOTAL AREA(ACRES) = 315.2 PEAK FLOW RATE(CFS) = 571.86
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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 FLOW PROCESS FROM NODE 421.00 TO NODE 427.00 IS CODE = 31

 >>>>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) = 1453.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 90.0 INCH PIPE IS 69.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.56
 ESTIMATED PIPE DIAMETER(INCH) = 90.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 571.86
 PIPE TRAVEL TIME(MIN.) = 1.56 Tc(MIN.) = 25.53
 LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

 FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 25.53
 RAINFALL INTENSITY(INCH/HR) = 1.92
 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.48
 EFFECTIVE STREAM AREA(ACRES) = 307.45
 TOTAL STREAM AREA(ACRES) = 315.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 571.86

 FLOW PROCESS FROM NODE 413.00 TO NODE 414.00 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) = 515.00 DOWNSTREAM(FEET) = 497.00

Tc = K*[(LENGTH** 3.00) / (ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.533
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.555
 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	0.10	0.30	0.100	56	5.53
PUBLIC PARK	B	1.10	0.30	0.850	56	8.79
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	0.10	0.30	0.600	56	7.50
COMMERCIAL	B	0.10	0.30	0.100	56	5.53
PUBLIC PARK	B	0.30	0.30	0.850	56	8.79
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.50	0.30	0.600	56	7.50

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.678
 SUBAREA RUNOFF(CFS) = 12.53
 TOTAL AREA(ACRES) = 3.20 PEAK FLOW RATE(CFS) = 12.53

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 FLOW PROCESS FROM NODE 414.00 TO NODE 414.10 IS CODE = 62

 >>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 497.00 DOWNSTREAM ELEVATION(FEET) = 493.00
 STREET LENGTH(FEET) = 371.00 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) = 20.41
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.49
HALFSTREET FLOOD WIDTH(FEET) = 18.48
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.15
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.55
STREET FLOW TRAVEL TIME(MIN.) = 1.96 Tc(MIN.) = 7.50

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* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.835
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
PUBLIC PARK B 1.40 0.30 0.850 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.40 0.30 0.600 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 2.00 0.30 0.600 56
SUBAREA AVERAGE PervIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PervIOUS AREA FRACTION, Ap = 0.673
SUBAREA AREA(ACRES) = 4.80 SUBAREA RUNOFF(CFS) = 15.70
EFFECTIVE AREA(ACRES) = 8.00 AREA-AVERAGED Fm(INCH/HR) = 0.20
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.68
TOTAL AREA(ACRES) = 8.0 PEAK FLOW RATE(CFS) = 26.16

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.53 HALFSTREET FLOOD WIDTH(FEET) = 20.35
FLOW VELOCITY(FEET/SEC.) = 3.36 DEPTH*VELOCITY(FT*FT/SEC.) = 1.77
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.10 = 701.00 FEET.

FLOW PROCESS FROM NODE 414.10 TO NODE 414.20 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====

UPSTREAM ELEVATION(FEET) = 493.00 DOWNSTREAM ELEVATION(FEET) = 490.00
STREET LENGTH(FEET) = 476.00 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) = 33.89
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.61
HALFSTREET FLOOD WIDTH(FEET) = 25.12
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.91
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.78

STREET FLOW TRAVEL TIME(MIN.) = 2.73 Tc(MIN.) = 10.23
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.218

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SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 0.50 0.30 0.100 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.40 0.30 0.600 56
COMMERCIAL B 0.40 0.30 0.100 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 1.20 0.30 0.600 56
SUBAREA AVERAGE PervIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PervIOUS AREA FRACTION, Ap = 0.512
SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 15.44
EFFECTIVE AREA(ACRES) = 13.60 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.61
TOTAL AREA(ACRES) = 13.6 PEAK FLOW RATE(CFS) = 37.15

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.63 HALFSTREET FLOOD WIDTH(FEET) = 25.98
FLOW VELOCITY(FEET/SEC.) = 2.99 DEPTH*VELOCITY(FT*FT/SEC.) = 1.87
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 414.20 = 1177.00 FEET.

FLOW PROCESS FROM NODE 414.20 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) = 490.00 DOWNSTREAM(FEET) = 465.00
FLOW LENGTH(FEET) = 488.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.03
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 37.15
PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 10.70
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 415.00 = 1665.00 FEET.

FLOW PROCESS FROM NODE 415.00 TO NODE 415.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

MAINLINE Tc(MIN.) = 10.70
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.136
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" B 0.10 0.30 0.900 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 2.30 0.30 0.600 56
APARTMENTS B 0.10 0.30 0.200 56
COMMERCIAL B 0.80 0.30 0.100 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B 3.20 0.30 0.600 56
SUBAREA AVERAGE PervIOUS LOSS RATE, Fp(INCH/HR) = 0.30

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SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.537$
 SUBAREA AREA (ACRES) = 6.50 SUBAREA RUNOFF (CFS) = 17.40
 EFFECTIVE AREA (ACRES) = 20.10 AREA-AVERAGED F_m (INCH/HR) = 0.18
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.59$
 TOTAL AREA (ACRES) = 20.1 PEAK FLOW RATE (CFS) = 53.55

 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) = 465.00 DOWNSTREAM(FEET) = 440.00
 FLOW LENGTH(FEET) = 497.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 18.46
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 53.55
 PIPE TRAVEL TIME(MIN.) = 0.45 T_c (MIN.) = 11.15
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 416.00 = 2162.00 FEET.

 FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE T_c (MIN.) = 11.15
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.063
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
COMMERCIAL	B	0.80	0.30	0.100	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.40	0.30	0.900	56
RESIDENTIAL "8-10 DWELLINGS/ACRE"	B	3.70	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.392$
 SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 12.99
 EFFECTIVE AREA (ACRES) = 25.00 AREA-AVERAGED F_m (INCH/HR) = 0.16
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.55$
 TOTAL AREA (ACRES) = 25.0 PEAK FLOW RATE (CFS) = 65.23

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 FLOW PROCESS FROM NODE 416.00 TO NODE 416.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE T_c (MIN.) = 11.15
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.063
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	1.80	0.30	0.200	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

RESIDENTIAL

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"3-4 DWELLINGS/ACRE" B 1.60 0.30 0.600 56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" B 3.60 0.30 0.200 56
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE" B 3.00 0.30 0.600 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.389$
 SUBAREA AREA (ACRES) = 10.10 SUBAREA RUNOFF (CFS) = 26.79
 EFFECTIVE AREA (ACRES) = 35.10 AREA-AVERAGED F_m (INCH/HR) = 0.15
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.50$
 TOTAL AREA (ACRES) = 35.1 PEAK FLOW RATE (CFS) = 92.02

 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) = 440.00 DOWNSTREAM(FEET) = 420.00
 FLOW LENGTH(FEET) = 437.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.31
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 92.02
 PIPE TRAVEL TIME(MIN.) = 0.36 T_c (MIN.) = 11.51
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 417.00 = 2599.00 FEET.

 FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE T_c (MIN.) = 11.51
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.009
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	1.50	0.30	0.200	56
COMMERCIAL	B	0.70	0.30	0.100	56
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	3.40	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.188$
 SUBAREA AREA (ACRES) = 5.60 SUBAREA RUNOFF (CFS) = 14.88
 EFFECTIVE AREA (ACRES) = 40.70 AREA-AVERAGED F_m (INCH/HR) = 0.14
 AREA-AVERAGED F_p (INCH/HR) = 0.30 AREA-AVERAGED $A_p = 0.46$
 TOTAL AREA (ACRES) = 40.7 PEAK FLOW RATE (CFS) = 105.18

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 FLOW PROCESS FROM NODE 417.00 TO NODE 417.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE T_c (MIN.) = 11.51
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.009
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	B	1.50	0.30	0.200	56
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56

RESIDENTIAL

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LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	B	4.60	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	4.00	0.30	0.200	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
COMMERCIAL	B	1.50	0.30	0.100	56
PUBLIC PARK	B	2.10	0.30	0.850	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	1.60	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.264
SUBAREA AREA (ACRES) = 14.00 SUBAREA RUNOFF (CFS) = 36.92
EFFECTIVE AREA (ACRES) = 54.70 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA (ACRES) = 54.7 PEAK FLOW RATE (CFS) = 142.10

FLOW PROCESS FROM NODE 417.00 TO NODE 418.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM (FEET) = 420.00 DOWNSTREAM (FEET) = 400.00
FLOW LENGTH (FEET) = 619.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 19.93
ESTIMATED PIPE DIAMETER (INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 142.10
PIPE TRAVEL TIME (MIN.) = 0.52 Tc (MIN.) = 12.03
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 418.00 = 3218.00 FEET.

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 12.03
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.935
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	B	2.10	0.30	0.100	56
COMMERCIAL	B	3.90	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	5.50	0.30	0.500	56
RESIDENTIAL					
"5-7 DWELLINGS/ACRE"	B	3.20	0.30	0.500	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.333
SUBAREA AREA (ACRES) = 15.60 SUBAREA RUNOFF (CFS) = 39.80
EFFECTIVE AREA (ACRES) = 70.30 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA (ACRES) = 70.3 PEAK FLOW RATE (CFS) = 178.26

D-30

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 12.03
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.935
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"	B	0.30	0.30	0.500	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.40	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	3.10	0.30	0.400	56
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	B	0.20	0.30	0.400	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.407
SUBAREA AREA (ACRES) = 4.00 SUBAREA RUNOFF (CFS) = 10.13
EFFECTIVE AREA (ACRES) = 74.30 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.39
TOTAL AREA (ACRES) = 74.3 PEAK FLOW RATE (CFS) = 188.39

D-30

FLOW PROCESS FROM NODE 418.00 TO NODE 418.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 12.03
* 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.935
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					
"11+ DWELLINGS/ACRE"	B	2.20	0.30	0.200	56
COMMERCIAL	B	3.70	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	3.50	0.30	0.200	56
COMMERCIAL	B	0.70	0.30	0.100	56
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	B	0.10	0.30	0.200	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.154
SUBAREA AREA (ACRES) = 10.80 SUBAREA RUNOFF (CFS) = 28.08
EFFECTIVE AREA (ACRES) = 85.10 AREA-AVERAGED Fm (INCH/HR) = 0.11
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.36
TOTAL AREA (ACRES) = 85.1 PEAK FLOW RATE (CFS) = 216.47

D-29

FLOW PROCESS FROM NODE 418.00 TO NODE 425.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM (FEET) = 400.00 DOWNSTREAM (FEET) = 320.00

FLOW LENGTH(FEET) = 1179.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 30.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 29.11
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 216.47
 PIPE TRAVEL TIME(MIN.) = 0.67 Tc(MIN.) = 12.70
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 425.00 = 4397.00 FEET.

 FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 12.70
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.846 **D-33**
 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	B	0.40	0.30	0.100	56
COMMERCIAL	B	0.90	0.30	0.100	56
PUBLIC PARK	B	5.30	0.30	0.850	56
PUBLIC PARK	B	3.10	0.30	0.850	56
PUBLIC PARK	B	9.10	0.30	0.850	56

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.777
 SUBAREA AREA(ACRES) = 19.40 SUBAREA RUNOFF(CFS) = 45.62
 EFFECTIVE AREA(ACRES) = 104.50 AREA-AVERAGED Fm(INCH/HR) = 0.13
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.44
 TOTAL AREA(ACRES) = 104.5 PEAK FLOW RATE(CFS) = 255.25

 FLOW PROCESS FROM NODE 425.00 TO NODE 425.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 12.70
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.846 **D-33**
 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	1.30	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.90	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.90	0.30	0.900	56

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 11.82
 EFFECTIVE AREA(ACRES) = 109.60 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 109.6 PEAK FLOW RATE(CFS) = 267.07

 FLOW PROCESS FROM NODE 425.00 TO NODE 426.00 IS CODE = 56

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 320.00 DOWNSTREAM(FEET) = 316.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 870.00 CHANNEL SLOPE = 0.0046
 GIVEN CHANNEL BASE(FEET) = 200.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.59
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.271 **D-36**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.40	0.30	0.100	56
COMMERCIAL	B	3.30	0.30	0.100	56
PUBLIC PARK	B	0.80	0.30	0.850	56
PUBLIC PARK	B	0.30	0.30	0.850	56

RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.90 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.30 0.30 0.900 56

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.408
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 277.72
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.33
 AVERAGE FLOW DEPTH(FEET) = 0.59 TRAVEL TIME(MIN.) = 6.22
 Tc(MIN.) = 18.92
 SUBAREA AREA(ACRES) = 11.00 SUBAREA RUNOFF(CFS) = 21.27
 EFFECTIVE AREA(ACRES) = 120.60 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 120.6 PEAK FLOW RATE(CFS) = 267.07
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
 GIVEN CHANNEL BASE(FEET) = 200.00 CHANNEL FREEBOARD(FEET) = 1.0
 "Z" FACTOR = 3.000 MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) = 1.58

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.58 FLOW VELOCITY(FEET/SEC.) = 2.30
 LONGEST FLOWPATH FROM NODE 413.00 TO NODE 426.00 = 5267.00 FEET.

 FLOW PROCESS FROM NODE 426.00 TO NODE 426.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 18.92
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.271 **D-37**
 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
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.70	0.30	0.900	56
PUBLIC PARK	B	0.50	0.30	0.850	56

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.569
 SUBAREA AREA(ACRES) = 3.70 SUBAREA RUNOFF(CFS) = 6.99
 EFFECTIVE AREA(ACRES) = 124.30 AREA-AVERAGED Fm(INCH/HR) = 0.14
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.46
 TOTAL AREA(ACRES) = 124.3 PEAK FLOW RATE(CFS) = 267.07

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

```
*****
FLOW PROCESS FROM NODE 426.00 TO NODE 427.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 316.00 DOWNSTREAM(FEET) = 310.00
FLOW LENGTH(FEET) = 321.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 42.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.83
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 267.07
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 19.21
LONGEST FLOWPATH FROM NODE 413.00 TO NODE 427.00 = 5588.00 FEET.
*****
FLOW PROCESS FROM NODE 427.00 TO NODE 427.00 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.) = 19.21
RAINFALL INTENSITY(INCH/HR) = 2.25
AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.46
EFFECTIVE STREAM AREA(ACRES) = 124.30
TOTAL STREAM AREA(ACRES) = 124.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 267.07
```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	571.86	25.53	1.917	0.30(0.15)	0.48	307.5	430.00
1	556.18	27.26	1.847	0.30(0.15)	0.49	315.2	400.00
2	267.07	19.21	2.252	0.30(0.14)	0.46	124.3	413.00

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	778.66	19.21	2.252	0.30(0.14)	0.48	355.6	413.00
2	796.62	25.53	1.917	0.30(0.14)	0.48	431.8	430.00
3	772.11	27.26	1.847	0.30(0.14)	0.48	439.5	400.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 796.62 Tc(MIN.) = 25.53
EFFECTIVE AREA(ACRES) = 431.75 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 439.5
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 427.00 = 10563.00 FEET.

```
*****
FLOW PROCESS FROM NODE 427.00 TO NODE 428.00 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) = 275.00
FLOW LENGTH(FEET) = 789.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 72.0 INCH PIPE IS 55.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 34.03
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 796.62
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 25.91
LONGEST FLOWPATH FROM NODE 430.00 TO NODE 428.00 = 11352.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 439.5 TC(MIN.) = 25.91
EFFECTIVE AREA(ACRES) = 431.75 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.477
PEAK FLOW RATE(CFS) = 796.62
```

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	778.66	19.59	2.227	0.30(0.14)	0.48	355.6	413.00
2	796.62	25.91	1.901	0.30(0.14)	0.48	431.8	430.00
3	772.11	27.65	1.833	0.30(0.14)	0.48	439.5	400.00

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 *
* 2-YR EV JUNE 2018 JMITAL *

FILE NAME: PA4E02EV.DAT
TIME/DATE OF STUDY: 10:33 06/03/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 1.600
- 2) 10.00; 1.060
- 3) 15.00; 0.840
- 4) 20.00; 0.720
- 5) 25.00; 0.630
- 6) 30.00; 0.560
- 7) 40.00; 0.480
- 8) 50.00; 0.420
- 9) 60.00; 0.366
- 10) 90.00; 0.300
- 11) 120.00; 0.246
- 12) 180.00; 0.190
- 13) 360.00; 0.136
- 14) 1200.00; 0.080

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 HIKE (FT) (FT) (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:

- 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
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.600

E-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.)
RESIDENTIAL						
".4 DWELLING/ACRE"	-	0.20	0.60	0.900	56	8.00
COMMERCIAL	-	0.80	0.60	0.100	56	5.00
RESIDENTIAL						
".4 DWELLING/ACRE"	-	0.50	0.60	0.900	56	8.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA RUNOFF(CFS) = 1.78
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 1.78

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) = 3.37
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.30
HALFSTREET FLOOD WIDTH(FEET) = 7.53
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.41
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.72
STREET FLOW TRAVEL TIME(MIN.) = 1.87 Tc(MIN.) = 6.87

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.398

E-2

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.100	-
USER-DEFINED	-	2.10	0.60	0.100	-
USER-DEFINED	-	0.70	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.293
SUBAREA AREA (ACRES) = 2.90 SUBAREA RUNOFF (CFS) = 3.19
EFFECTIVE AREA (ACRES) = 4.40 AREA-AVERAGED Fm (INCH/HR) = 0.21
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.35
TOTAL AREA (ACRES) = 4.4 PEAK FLOW RATE (CFS) = 4.69

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.32 HALFSTREET FLOOD WIDTH (FEET) = 8.97
FLOW VELOCITY (FEET/SEC.) = 2.57 DEPTH*VELOCITY (FT*FT/SEC.) = 0.83
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 (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 7.53

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.36
HALFSTREET FLOOD WIDTH (FEET) = 11.21
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.86
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.04

STREET FLOW TRAVEL TIME (MIN.) = 2.28 Tc (MIN.) = 9.15

E-2.1

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.152

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.60	0.100	-
USER-DEFINED	-	0.20	0.60	0.900	-
USER-DEFINED	-	3.00	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	1.70	0.60	0.100	-
USER-DEFINED	-	0.50	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.205

SUBAREA AREA (ACRES) = 6.10 SUBAREA RUNOFF (CFS) = 5.65

EFFECTIVE AREA (ACRES) = 10.50 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.27
TOTAL AREA (ACRES) = 10.5 PEAK FLOW RATE (CFS) = 9.37

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.38 HALFSTREET FLOOD WIDTH (FEET) = 12.30
FLOW VELOCITY (FEET/SEC.) = 3.03 DEPTH*VELOCITY (FT*FT/SEC.) = 1.16
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
ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.9 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 12.56
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 9.37
PIPE TRAVEL TIME (MIN.) = 1.12 Tc (MIN.) = 10.27
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.) = 10.27

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.048

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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
USER-DEFINED	-	2.00	0.60	0.900	-
USER-DEFINED	-	2.20	0.60	0.900	-
USER-DEFINED	-	4.20	0.60	0.900	-
USER-DEFINED	-	5.30	0.60	0.100	-
USER-DEFINED	-	7.10	0.60	0.100	-
USER-DEFINED	-	8.60	0.60	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.329

SUBAREA AREA (ACRES) = 29.40 SUBAREA RUNOFF (CFS) = 22.52

EFFECTIVE AREA (ACRES) = 39.90 AREA-AVERAGED Fm (INCH/HR) = 0.19

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.31

TOTAL AREA (ACRES) = 39.9 PEAK FLOW RATE (CFS) = 30.91

FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 10.27

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.048

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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USER-DEFINED - 0.60 0.60 0.900 -
 USER-DEFINED - 1.30 0.60 0.900 -
 USER-DEFINED - 5.60 0.60 0.100 -
 USER-DEFINED - 8.30 0.60 0.100 -
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.196
 SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 13.23
 EFFECTIVE AREA(ACRES) = 55.70 AREA-AVERAGED Fm(INCH/HR) = 0.17
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.28
 TOTAL AREA(ACRES) = 55.7 PEAK FLOW RATE(CFS) = 44.15

 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.) = 10.27
 RAINFALL INTENSITY(INCH/HR) = 1.05
 AREA-AVERAGED Fm(INCH/HR) = 0.17
 AREA-AVERAGED Fp(INCH/HR) = 0.60
 AREA-AVERAGED Ap = 0.28
 EFFECTIVE STREAM AREA(ACRES) = 55.70
 TOTAL STREAM AREA(ACRES) = 55.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 44.15

 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
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.154

OE-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"	-	0.10	0.60	1.000	56	9.13
NATURAL FAIR COVER "OPEN BRUSH"	-	0.10	0.60	1.000	56	9.13
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	-	0.20	0.60	1.000	56	9.13
NATURAL FAIR COVER "OPEN BRUSH"	-	0.50	0.60	1.000	56	9.13

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 0.45
 TOTAL AREA(ACRES) = 0.90 PEAK FLOW RATE(CFS) = 0.45

 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
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.007

OE-2

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.10	0.60	1.000	-
USER-DEFINED	-	3.10	0.60	1.000	-
USER-DEFINED	-	3.20	0.60	1.000	-

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.59
 AVERAGE FLOW DEPTH(FEET) = 0.35 TRAVEL TIME(MIN.) = 2.07
 Tc(MIN.) = 11.20
 SUBAREA AREA(ACRES) = 8.40 SUBAREA RUNOFF(CFS) = 3.08
 EFFECTIVE AREA(ACRES) = 9.30 AREA-AVERAGED Fm(INCH/HR) = 0.60
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 9.3 PEAK FLOW RATE(CFS) = 3.41

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.42 FLOW VELOCITY(FEET/SEC.) = 6.37
 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
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.835

OE-3

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.30	0.60	1.000	-
USER-DEFINED	-	0.70	0.60	1.000	-
USER-DEFINED	-	1.20	0.60	1.000	-
USER-DEFINED	-	5.80	0.60	1.000	-
USER-DEFINED	-	6.30	0.60	1.000	-

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.96
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.19
 AVERAGE FLOW DEPTH(FEET) = 0.63 TRAVEL TIME(MIN.) = 4.02
 Tc(MIN.) = 15.22
 SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 3.04
 EFFECTIVE AREA(ACRES) = 23.70 AREA-AVERAGED Fm(INCH/HR) = 0.60
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 23.7 PEAK FLOW RATE (CFS) = 5.01

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 0.63 FLOW VELOCITY (FEET/SEC.) = 4.20
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.) = 15.22

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.835

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SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

USER-DEFINED - 10.40 0.60 1.000 -

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000

SUBAREA AREA (ACRES) = 10.40 SUBAREA RUNOFF (CFS) = 2.20

EFFECTIVE AREA (ACRES) = 34.10 AREA-AVERAGED Fm (INCH/HR) = 0.60

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 34.1 PEAK FLOW RATE (CFS) = 7.21

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

ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.7 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 11.97

ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 7.21

PIPE TRAVEL TIME (MIN.) = 1.46 Tc (MIN.) = 16.68

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.) = 16.68

RAINFALL INTENSITY (INCH/HR) = 0.80

AREA-AVERAGED Fm (INCH/HR) = 0.60

AREA-AVERAGED Fp (INCH/HR) = 0.60

AREA-AVERAGED Ap = 1.00

EFFECTIVE STREAM AREA (ACRES) = 34.10

TOTAL STREAM AREA (ACRES) = 34.10

PEAK FLOW RATE (CFS) AT CONFLUENCE = 7.21

** CONFLUENCE DATA **

STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 44.15 10.27 1.048 0.60(0.17) 0.28 55.7 800.00
2 7.21 16.68 0.800 0.60(0.60) 1.00 34.1 810.00

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 51.35 10.27 1.048 0.60(0.29) 0.48 76.7 800.00
2 38.89 16.68 0.800 0.60(0.33) 0.55 89.8 810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 51.35 Tc (MIN.) = 10.27

EFFECTIVE AREA (ACRES) = 76.69 AREA-AVERAGED Fm (INCH/HR) = 0.29

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.48

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 24.0 INCH PIPE IS 17.3 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 21.13

ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 51.35

PIPE TRAVEL TIME (MIN.) = 0.60 Tc (MIN.) = 10.86

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.) = 10.86

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.022

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SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

USER-DEFINED - 5.60 0.60 0.200 -

USER-DEFINED - 12.30 0.60 0.200 -

USER-DEFINED - 0.50 0.60 0.100 -

USER-DEFINED - 5.40 0.60 0.100 -

USER-DEFINED - 4.70 0.60 0.900 -

USER-DEFINED - 4.20 0.60 0.900 -

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.372

SUBAREA AREA (ACRES) = 32.70 SUBAREA RUNOFF (CFS) = 23.50

EFFECTIVE AREA (ACRES) = 109.39 AREA-AVERAGED Fm (INCH/HR) = 0.27

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.45

TOTAL AREA (ACRES) = 122.5 PEAK FLOW RATE (CFS) = 74.31

FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.86

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.022

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	9.90	0.60	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 9.90 SUBAREA RUNOFF(CFS) = 8.57
EFFECTIVE AREA(ACRES) = 119.29 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 132.4 PEAK FLOW RATE(CFS) = 82.88

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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.) = 10.86

RAINFALL INTENSITY(INCH/HR) = 1.02

AREA-AVERAGED Fm(INCH/HR) = 0.25

AREA-AVERAGED Fp(INCH/HR) = 0.60

AREA-AVERAGED Ap = 0.42

EFFECTIVE STREAM AREA(ACRES) = 119.29

TOTAL STREAM AREA(ACRES) = 132.40

PEAK FLOW RATE(CFS) AT CONFLUENCE = 82.88

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

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.183

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"	-	0.10	0.60	1.000	56	8.86
NATURAL FAIR COVER "OPEN BRUSH"	-	0.30	0.60	1.000	56	8.86
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	-	0.60	0.60	1.000	56	8.86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

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SUBAREA RUNOFF(CFS) = 0.52

TOTAL AREA(ACRES) = 1.00 PEAK FLOW RATE(CFS) = 0.52

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

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.900

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.100	-
USER-DEFINED	-	0.90	0.60	0.900	-
USER-DEFINED	-	1.30	0.60	0.100	-
USER-DEFINED	-	0.80	0.60	1.000	-
USER-DEFINED	-	2.40	0.60	1.000	-
USER-DEFINED	-	3.20	0.60	1.000	-

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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.845

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.12

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.07

AVERAGE FLOW DEPTH(FEET) = 0.42 TRAVEL TIME(MIN.) = 4.78

Tc(MIN.) = 13.65

SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 3.08

EFFECTIVE AREA(ACRES) = 9.70 AREA-AVERAGED Fm(INCH/HR) = 0.52

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.86

TOTAL AREA(ACRES) = 9.7 PEAK FLOW RATE(CFS) = 3.35

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.49 FLOW VELOCITY(FEET/SEC.) = 4.59

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.) = 13.65

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.900

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.00	0.60	1.000	-
USER-DEFINED	-	7.10	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 2.99
EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.94
TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 6.34

OE-5

FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.65
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.900

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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
USER-DEFINED	-	3.40	0.60	1.000	-
USER-DEFINED	-	1.80	0.60	1.000	-
USER-DEFINED	-	3.60	0.60	1.000	-
USER-DEFINED	-	1.00	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.50	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.913
SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 3.29
EFFECTIVE AREA(ACRES) = 31.20 AREA-AVERAGED Fm(INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.93
TOTAL AREA(ACRES) = 31.2 PEAK FLOW RATE(CFS) = 9.63

FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.65
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.900

OE-6

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.60	0.60	1.000	-
USER-DEFINED	-	2.60	0.60	1.000	-
USER-DEFINED	-	0.20	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.997
SUBAREA AREA(ACRES) = 7.40 SUBAREA RUNOFF(CFS) = 2.01
EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.94
TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 11.64

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
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.21
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.64
PIPE TRAVEL TIME(MIN.) = 1.68 Tc(MIN.) = 15.33
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.) = 15.33
RAINFALL INTENSITY (INCH/HR) = 0.83
AREA-AVERAGED Fm(INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.94
EFFECTIVE STREAM AREA(ACRES) = 38.60
TOTAL STREAM AREA(ACRES) = 38.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.64

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	82.88	10.86	1.022	0.60(0.25)	0.42	119.3	800.00
1	59.52	17.32	0.784	0.60(0.28)	0.47	132.4	810.00
2	11.64	15.33	0.832	0.60(0.56)	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	94.52	10.86	1.022	0.60(0.31)	0.51	146.6	800.00
2	78.38	15.33	0.832	0.60(0.34)	0.57	166.9	818.00
3	69.08	17.32	0.784	0.60(0.35)	0.58	171.0	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 94.52 Tc(MIN.) = 10.86
EFFECTIVE AREA(ACRES) = 146.64 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.51
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.) = 10.86
EFFECTIVE AREA(ACRES) = 146.64 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.515
PEAK FLOW RATE(CFS) = 94.52

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	94.52	10.86	1.022	0.60(0.31)	0.51	146.6	800.00
2	78.38	15.33	0.832	0.60(0.34)	0.57	166.9	818.00
3	69.08	17.32	0.784	0.60(0.35)	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 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 5-YR EV JUNE 2018 JMITAL *

FILE NAME: PA4E05EV.DAT
TIME/DATE OF STUDY: 10:23 06/03/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 5.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 2.180
- 2) 10.00; 1.510
- 3) 15.00; 1.200
- 4) 20.00; 1.020
- 5) 25.00; 0.900
- 6) 30.00; 0.830
- 7) 40.00; 0.690
- 8) 50.00; 0.610
- 9) 60.00; 0.550
- 10) 90.00; 0.440
- 11) 120.00; 0.370
- 12) 180.00; 0.310
- 13) 360.00; 0.210
- 14) 1200.00; 0.090

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 HIKE (FT) (FT) (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:

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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.180

E-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.)
RESIDENTIAL ".4 DWELLING/ACRE"	-	0.20	0.50	0.900	56	8.00
COMMERCIAL	-	0.80	0.50	0.100	56	5.00
RESIDENTIAL ".4 DWELLING/ACRE"	-	0.50	0.50	0.900	56	8.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA RUNOFF(CFS) = 2.62
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 2.62

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) = 4.98
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 9.28
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.58
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.85
STREET FLOW TRAVEL TIME(MIN.) = 1.74 Tc(MIN.) = 6.74

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.947

E-2

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.100	-
USER-DEFINED	-	2.10	0.50	0.100	-
USER-DEFINED	-	0.70	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.293
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 4.70
EFFECTIVE AREA(ACRES) = 4.40 AREA-AVERAGED Fm(INCH/HR) = 0.18
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 4.4 PEAK FLOW RATE(CFS) = 7.01

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 10.90
FLOW VELOCITY(FEET/SEC.) = 2.79 DEPTH*VELOCITY(FT*FT/SEC.) = 1.00
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) = 11.31

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.40
HALFSTREET FLOOD WIDTH(FEET) = 13.40
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.15
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.26
STREET FLOW TRAVEL TIME(MIN.) = 2.07 Tc(MIN.) = 8.81

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.669

E-2.1

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	0.20	0.50	0.900	-
USER-DEFINED	-	3.00	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	1.70	0.50	0.100	-
USER-DEFINED	-	0.50	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.205
SUBAREA AREA(ACRES) = 6.10 SUBAREA RUNOFF(CFS) = 8.60

EFFECTIVE AREA(ACRES) = 10.50 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.27
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 14.51

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 14.88
FLOW VELOCITY(FEET/SEC.) = 3.34 DEPTH*VELOCITY(FT*FT/SEC.) = 1.43
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 18.0 INCH PIPE IS 10.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.00
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.51
PIPE TRAVEL TIME(MIN.) = 1.00 Tc(MIN.) = 9.82
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.) = 9.82

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.535

E-3

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.00	0.50	0.900	-
USER-DEFINED	-	2.20	0.50	0.900	-
USER-DEFINED	-	4.20	0.50	0.900	-
USER-DEFINED	-	5.30	0.50	0.100	-
USER-DEFINED	-	7.10	0.50	0.100	-
USER-DEFINED	-	8.60	0.50	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.329
SUBAREA AREA(ACRES) = 29.40 SUBAREA RUNOFF(CFS) = 36.26
EFFECTIVE AREA(ACRES) = 39.90 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 39.9 PEAK FLOW RATE(CFS) = 49.50

FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.82

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.535

E-4

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	0.900	-

USER-DEFINED - 1.30 0.50 0.900 -
 USER-DEFINED - 5.60 0.50 0.100 -
 USER-DEFINED - 8.30 0.50 0.100 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
 SUBAREA AREA (ACRES) = 15.80 SUBAREA RUNOFF (CFS) = 20.43
 EFFECTIVE AREA (ACRES) = 55.70 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.28
 TOTAL AREA (ACRES) = 55.7 PEAK FLOW RATE (CFS) = 69.93

 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.) = 9.82
 RAINFALL INTENSITY (INCH/HR) = 1.53
 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.50
 AREA-AVERAGED Ap = 0.28
 EFFECTIVE STREAM AREA (ACRES) = 55.70
 TOTAL STREAM AREA (ACRES) = 55.70
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 69.93

 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
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.627

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"	-	0.10	0.50	1.000	56	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	-	0.10	0.50	1.000	56	9.13
NATURAL FAIR COVER						
"CHAPARRAL, BROADLEAF"	-	0.20	0.50	1.000	56	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	-	0.50	0.50	1.000	56	9.13

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF (CFS) = 0.91
 TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 0.91

 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
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.460

OE-2

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.10	0.50	1.000	-
USER-DEFINED	-	3.10	0.50	1.000	-
USER-DEFINED	-	3.20	0.50	1.000	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 4.55
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.92
 AVERAGE FLOW DEPTH (FEET) = 0.47 TRAVEL TIME (MIN.) = 1.67
 Tc (MIN.) = 10.80
 SUBAREA AREA (ACRES) = 8.40 SUBAREA RUNOFF (CFS) = 7.26
 EFFECTIVE AREA (ACRES) = 9.30 AREA-AVERAGED Fm (INCH/HR) = 0.50
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 9.3 PEAK FLOW RATE (CFS) = 8.04

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.58 FLOW VELOCITY (FEET/SEC.) = 8.05
 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
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.264

OE-3

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.30	0.50	1.000	-
USER-DEFINED	-	0.70	0.50	1.000	-
USER-DEFINED	-	1.20	0.50	1.000	-
USER-DEFINED	-	5.80	0.50	1.000	-
USER-DEFINED	-	6.30	0.50	1.000	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 13.02
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.32
 AVERAGE FLOW DEPTH (FEET) = 0.90 TRAVEL TIME (MIN.) = 3.16
 Tc (MIN.) = 13.97
 SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 9.90
 EFFECTIVE AREA (ACRES) = 23.70 AREA-AVERAGED Fm (INCH/HR) = 0.50
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 23.7 PEAK FLOW RATE (CFS) = 16.29

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.98 FLOW VELOCITY(FEET/SEC.) = 5.66
 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.) = 13.97
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.264
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 10.40 0.50 1.000 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 7.15
 EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.50
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 34.1 PEAK FLOW RATE(CFS) = 23.44

OE-3

 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 18.0 INCH PIPE IS 14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.64
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 23.44
 PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 15.08
 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.) = 15.08
 RAINFALL INTENSITY(INCH/HR) = 1.20
 AREA-AVERAGED Fm(INCH/HR) = 0.50
 AREA-AVERAGED Fp(INCH/HR) = 0.50
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA(ACRES) = 34.10
 TOTAL STREAM AREA(ACRES) = 34.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 23.44

** CONFLUENCE DATA **
 STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE

1	69.93	9.82	1.535	0.50(0.14)	0.28	55.7	800.00
2	23.44	15.08	1.197	0.50(0.50)	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	92.58	9.82	1.535	0.50(0.24)	0.48	77.9	800.00
2	76.44	15.08	1.197	0.50(0.28)	0.55	89.8	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 92.58 Tc(MIN.) = 9.82
 EFFECTIVE AREA(ACRES) = 77.89 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.48
 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 30.0 INCH PIPE IS 21.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 24.50
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 92.58
 PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 10.33
 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.) = 10.33
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.490
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 5.60 0.50 0.200 -
 USER-DEFINED - 12.30 0.50 0.200 -
 USER-DEFINED - 0.50 0.50 0.100 -
 USER-DEFINED - 5.40 0.50 0.100 -
 USER-DEFINED - 4.70 0.50 0.900 -
 USER-DEFINED - 4.20 0.50 0.900 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.372
 SUBAREA AREA(ACRES) = 32.70 SUBAREA RUNOFF(CFS) = 38.36
 EFFECTIVE AREA(ACRES) = 110.59 AREA-AVERAGED Fm(INCH/HR) = 0.23
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.45
 TOTAL AREA(ACRES) = 122.5 PEAK FLOW RATE(CFS) = 125.78

E-5

FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 10.33 **E-5**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.490
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 9.90 0.50 0.100 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 9.90 SUBAREA RUNOFF(CFS) = 12.83
 EFFECTIVE AREA(ACRES) = 120.49 AREA-AVERAGED Fm(INCH/HR) = 0.21
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.42
 TOTAL AREA(ACRES) = 132.4 PEAK FLOW RATE(CFS) = 138.60

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.) = 10.33
 RAINFALL INTENSITY (INCH/HR) = 1.49
 AREA-AVERAGED Fm(INCH/HR) = 0.21
 AREA-AVERAGED Fp(INCH/HR) = 0.50
 AREA-AVERAGED Ap = 0.42
 EFFECTIVE STREAM AREA(ACRES) = 120.49
 TOTAL STREAM AREA(ACRES) = 132.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 138.60

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 **OE-4**
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.864
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.662
 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" - 0.10 0.50 1.000 56 8.86
 NATURAL FAIR COVER
 "OPEN BRUSH" - 0.30 0.50 1.000 56 8.86
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" - 0.60 0.50 1.000 56 8.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 1.05
 TOTAL AREA(ACRES) = 1.00 PEAK FLOW RATE(CFS) = 1.05

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**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.338
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 0.10 0.50 0.100 -
 USER-DEFINED - 0.90 0.50 0.900 -
 USER-DEFINED - 1.30 0.50 0.100 -
 USER-DEFINED - 0.80 0.50 1.000 -
 USER-DEFINED - 2.40 0.50 1.000 -
 USER-DEFINED - 3.20 0.50 1.000 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.845
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.67
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.96
 AVERAGE FLOW DEPTH(FEET) = 0.56 TRAVEL TIME(MIN.) = 3.92
 Tc(MIN.) = 12.78
 SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 7.16
 EFFECTIVE AREA(ACRES) = 9.70 AREA-AVERAGED Fm(INCH/HR) = 0.43
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.86
 TOTAL AREA(ACRES) = 9.7 PEAK FLOW RATE(CFS) = 7.92

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.68 FLOW VELOCITY(FEET/SEC.) = 5.68
 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.) = 12.78 **OE-5**
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.338
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 4.00 0.50 1.000 -
 USER-DEFINED - 7.10 0.50 1.000 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 8.36
 EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.47
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.94
 TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 16.28

FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 12.78

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.338 **OE-6**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.40	0.50	1.000	-
USER-DEFINED	-	1.80	0.50	1.000	-
USER-DEFINED	-	3.60	0.50	1.000	-
USER-DEFINED	-	1.00	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.50	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.913

SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 8.24

EFFECTIVE AREA(ACRES) = 31.20 AREA-AVERAGED Fm(INCH/HR) = 0.46

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.93

TOTAL AREA(ACRES) = 31.2 PEAK FLOW RATE(CFS) = 24.53

FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

MAINLINE Tc(MIN.) = 12.78

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.338 **OE-6**

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	4.60	0.50	1.000	-
USER-DEFINED	-	2.60	0.50	1.000	-
USER-DEFINED	-	0.20	0.50	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.997

SUBAREA AREA(ACRES) = 7.40 SUBAREA RUNOFF(CFS) = 5.59

EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.47

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.94

TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 30.11

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 21.0 INCH PIPE IS 16.3 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 15.02

ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 30.11

PIPE TRAVEL TIME(MIN.) = 1.37 Tc(MIN.) = 14.15

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.) = 14.15

RAINFALL INTENSITY(INCH/HR) = 1.25

AREA-AVERAGED Fm(INCH/HR) = 0.47

AREA-AVERAGED Fp(INCH/HR) = 0.50

AREA-AVERAGED Ap = 0.94

EFFECTIVE STREAM AREA(ACRES) = 38.60

TOTAL STREAM AREA(ACRES) = 38.60

PEAK FLOW RATE(CFS) AT CONFLUENCE = 30.11

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	138.60	10.33	1.490	0.50(0.21)	0.42	120.5	800.00
1	112.01	15.63	1.177	0.50(0.24)	0.47	132.4	810.00
2	30.11	14.15	1.253	0.50(0.47)	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	167.24	10.33	1.490	0.50(0.26)	0.52	148.7	800.00
2	149.55	14.15	1.253	0.50(0.29)	0.57	167.7	818.00
3	139.21	15.63	1.177	0.50(0.29)	0.58	171.0	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 167.24 Tc(MIN.) = 10.33

EFFECTIVE AREA(ACRES) = 148.67 AREA-AVERAGED Fm(INCH/HR) = 0.26

AREA-AVERAGED Fp(INCH/HR) = 0.50 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.) = 10.33

EFFECTIVE AREA(ACRES) = 148.67 AREA-AVERAGED Fm(INCH/HR) = 0.26

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.521

PEAK FLOW RATE(CFS) = 167.24

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	167.24	10.33	1.490	0.50(0.26)	0.52	148.7	800.00
2	149.55	14.15	1.253	0.50(0.29)	0.57	167.7	818.00
3	139.21	15.63	1.177	0.50(0.29)	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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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* RMV PA-4 SUBAREA E ROMP *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 10-YR EV JUNE 2018 JMITAL *

FILE NAME: PA4E10EV.DAT
TIME/DATE OF STUDY: 10:13 06/03/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 5.00
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 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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 3.185
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"	B	0.20	0.30	0.900	56	8.00
COMMERCIAL	B	0.80	0.30	0.100	56	5.00
RESIDENTIAL						
".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56	8.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA RUNOFF(CFS) = 4.11
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 4.11

E-1

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) = 7.56

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.36
HALFSTREET FLOOD WIDTH(FEET) = 11.29
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.84
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.03
STREET FLOW TRAVEL TIME(MIN.) = 1.59 Tc(MIN.) = 6.59
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.728

E-2

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
COMMERCIAL	B	2.10	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.293
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 6.89
EFFECTIVE AREA(ACRES) = 4.40 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 4.4 PEAK FLOW RATE(CFS) = 10.38

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 13.01
 FLOW VELOCITY(FEET/SEC.) = 3.05 DEPTH*VELOCITY(FT*FT/SEC.) = 1.20
 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) = 16.72
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.45
 HALFSTREET FLOOD WIDTH(FEET) = 15.82
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.44
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.53
 STREET FLOW TRAVEL TIME(MIN.) = 1.89 Tc(MIN.) = 8.48
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.367 **E-2.1**

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	0.20	0.30	0.900	56
COMMERCIAL	B	3.00	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
COMMERCIAL	B	1.70	0.30	0.100	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	0.50	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.205
 SUBAREA AREA(ACRES) = 6.10 SUBAREA RUNOFF(CFS) = 12.66
 EFFECTIVE AREA(ACRES) = 10.50 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.27
 TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 21.61

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.54
 FLOW VELOCITY(FEET/SEC.) = 3.67 DEPTH*VELOCITY(FT*FT/SEC.) = 1.75
 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 18.0 INCH PIPE IS 13.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.11
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 21.61
 PIPE TRAVEL TIME(MIN.) = 0.93 Tc(MIN.) = 9.41
 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.) = 9.41
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.233 **E-3**
 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	2.00	0.30	0.900	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	4.20	0.30	0.900	56
COMMERCIAL	B	5.30	0.30	0.100	56
COMMERCIAL	B	7.10	0.30	0.100	56
COMMERCIAL	B	8.60	0.30	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.329
 SUBAREA AREA(ACRES) = 29.40 SUBAREA RUNOFF(CFS) = 56.47
 EFFECTIVE AREA(ACRES) = 39.90 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
 TOTAL AREA(ACRES) = 39.9 PEAK FLOW RATE(CFS) = 76.81

 FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.41
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.233 **E-4**
 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	0.60	0.30	0.900	56
RESIDENTIAL					
" .4 DWELLING/ACRE"	B	1.30	0.30	0.900	56
COMMERCIAL	B	5.60	0.30	0.100	56
COMMERCIAL	B	8.30	0.30	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
 SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 30.91

EFFECTIVE AREA (ACRES) = 55.70 AREA-AVERAGED Fm (INCH/HR) = 0.08
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.28
TOTAL AREA (ACRES) = 55.7 PEAK FLOW RATE (CFS) = 107.73

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.) = 9.41
RAINFALL INTENSITY (INCH/HR) = 2.23
AREA-AVERAGED Fm (INCH/HR) = 0.08
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.28
EFFECTIVE STREAM AREA (ACRES) = 55.70
TOTAL STREAM AREA (ACRES) = 55.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 107.73

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.271

OE-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"	B	0.10	0.30	1.000	63	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	B	0.10	0.30	1.000	66	9.13
NATURAL FAIR COVER						
"CHAPARRAL, BROADLEAF"	B	0.20	0.30	1.000	63	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	B	0.50	0.30	1.000	66	9.13

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 1.60
TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 1.60

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

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.091

OE-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"	B	2.10	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	3.10	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.20	0.30	1.000	66

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 8.38
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 8.02
AVERAGE FLOW DEPTH (FEET) = 0.59 TRAVEL TIME (MIN.) = 1.44
Tc (MIN.) = 10.57
SUBAREA AREA (ACRES) = 8.40 SUBAREA RUNOFF (CFS) = 13.54
EFFECTIVE AREA (ACRES) = 9.30 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 9.3 PEAK FLOW RATE (CFS) = 14.99

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.73 FLOW VELOCITY (FEET/SEC.) = 9.39
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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.843

OE-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					
"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"	B	1.20	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	5.80	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	6.30	0.30	1.000	66

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 25.00
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.31
AVERAGE FLOW DEPTH (FEET) = 1.15 TRAVEL TIME (MIN.) = 2.67
Tc (MIN.) = 13.24
SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 19.99

EFFECTIVE AREA(ACRES) = 23.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 23.7 PEAK FLOW RATE(CFS) = 32.90

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.28 FLOW VELOCITY(FEET/SEC.) = 6.73
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.) = 13.24
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.843
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 10.40 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 14.44
EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 34.1 PEAK FLOW RATE(CFS) = 47.34

OE-3

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 24.0 INCH PIPE IS 17.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.84
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 47.34
PIPE TRAVEL TIME(MIN.) = 0.93 Tc(MIN.) = 14.17
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.) = 14.17
RAINFALL INTENSITY(INCH/HR) = 1.77
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 34.10
TOTAL STREAM AREA(ACRES) = 34.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 47.34

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	107.73	9.41	2.233	0.30(0.08)	0.28	55.7	800.00
2	47.34	14.17	1.774	0.30(0.30)	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	148.95	9.41	2.233	0.30(0.15)	0.49	78.3	800.00
2	132.07	14.17	1.774	0.30(0.17)	0.55	89.8	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 148.95 Tc(MIN.) = 9.41
EFFECTIVE AREA(ACRES) = 78.35 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 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 36.0 INCH PIPE IS 25.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.63
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 148.95
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 9.86
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.) = 9.86
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.174
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 5.60 0.30 0.200 56
APARTMENTS B 12.30 0.30 0.200 56
COMMERCIAL B 0.50 0.30 0.100 56
COMMERCIAL B 5.40 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.70 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.20 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.372

E-5

SUBAREA AREA (ACRES) = 32.70 SUBAREA RUNOFF (CFS) = 60.70
EFFECTIVE AREA (ACRES) = 111.05 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
TOTAL AREA (ACRES) = 122.5 PEAK FLOW RATE (CFS) = 203.68

FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 9.86
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.174 **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 B 9.90 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA (ACRES) = 9.90 SUBAREA RUNOFF (CFS) = 19.10
EFFECTIVE AREA (ACRES) = 120.95 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
TOTAL AREA (ACRES) = 132.4 PEAK FLOW RATE (CFS) = 222.79

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.) = 9.86
RAINFALL INTENSITY (INCH/HR) = 2.17
AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA (ACRES) = 120.95
TOTAL STREAM AREA (ACRES) = 132.40
PEAK FLOW RATE (CFS) AT CONFLUENCE = 222.79

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.309 **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" B 0.10 0.30 1.000 63 8.86
NATURAL FAIR COVER
"OPEN BRUSH" B 0.30 0.30 1.000 66 8.86

NATURAL FAIR COVER
"CHAPARRAL, BROADLEAF" B 0.60 0.30 1.000 63 8.86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 1.81
TOTAL AREA (ACRES) = 1.00 PEAK FLOW RATE (CFS) = 1.81

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.926 **OE-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 0.10 0.30 0.100 56
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" B 0.80 0.30 1.000 66
NATURAL FAIR COVER
"OPEN BRUSH" B 2.40 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL, BROADLEAF" B 3.20 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.845
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 8.40
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.76
AVERAGE FLOW DEPTH (FEET) = 0.70 TRAVEL TIME (MIN.) = 3.38
Tc (MIN.) = 12.24
SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 13.09
EFFECTIVE AREA (ACRES) = 9.70 AREA-AVERAGED Fm (INCH/HR) = 0.26
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.86
TOTAL AREA (ACRES) = 9.7 PEAK FLOW RATE (CFS) = 14.56

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.86 FLOW VELOCITY (FEET/SEC.) = 6.60
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.) = 12.24
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.926 **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" B 7.10 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 16.24
 EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94
 TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 30.80

FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 12.24
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.926

OE-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					
"CHAPARRAL,BROADLEAF"	B	3.40	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	1.80	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	3.60	0.30	1.000	63
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) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.913					
SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 15.46					
EFFECTIVE AREA(ACRES) = 31.20 AREA-AVERAGED Fm(INCH/HR) = 0.28					
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.93					
TOTAL AREA(ACRES) = 31.2 PEAK FLOW RATE(CFS) = 46.26					

FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 12.24
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.926

OE-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"	B	4.60	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.60	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.997					
SUBAREA AREA(ACRES) = 7.40 SUBAREA RUNOFF(CFS) = 10.83					
EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.28					
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94					

TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 57.09

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 27.0 INCH PIPE IS 20.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.71
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 57.09
 PIPE TRAVEL TIME(MIN.) = 1.16 Tc(MIN.) = 13.40
 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.) = 13.40
 RAINFALL INTENSITY(INCH/HR) = 1.83
 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.94
 EFFECTIVE STREAM AREA(ACRES) = 38.60
 TOTAL STREAM AREA(ACRES) = 38.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 57.09

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	222.79	9.86	2.174	0.30(0.13)	0.42	120.9	800.00
1	190.52	14.64	1.741	0.30(0.14)	0.47	132.4	810.00
2	57.09	13.40	1.830	0.30(0.28)	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	274.15	9.86	2.174	0.30(0.16)	0.52	149.4	800.00
2	256.01	13.40	1.830	0.30(0.17)	0.57	168.0	818.00
3	244.33	14.64	1.741	0.30(0.17)	0.58	171.0	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 274.15 Tc(MIN.) = 9.86
 EFFECTIVE AREA(ACRES) = 149.36 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 9.86
EFFECTIVE AREA (ACRES) = 149.36 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.523
PEAK FLOW RATE (CFS) = 274.15

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	274.15	9.86	2.174	0.30 (0.16)	0.52	149.4	800.00
2	256.01	13.40	1.830	0.30 (0.17)	0.57	168.0	818.00
3	244.33	14.64	1.741	0.30 (0.17)	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 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 25-YR EV JUNE 2018 JMITAL *

FILE NAME: PA4E25EV.DAT
TIME/DATE OF STUDY: 10:13 06/03/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
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:

- 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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.060
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"	B	0.20	0.30	0.900	56	8.00
COMMERCIAL	B	0.80	0.30	0.100	56	5.00
RESIDENTIAL						
".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56	8.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA RUNOFF(CFS) = 5.29
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 5.29

E-1

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) = 9.74

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 12.62
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.02
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.17
STREET FLOW TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 6.49
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.495

E-2

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
COMMERCIAL	B	2.10	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.293
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 8.89
EFFECTIVE AREA(ACRES) = 4.40 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 4.4 PEAK FLOW RATE(CFS) = 13.42

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.49
FLOW VELOCITY(FEET/SEC.) = 3.24 DEPTH*VELOCITY(FT*FT/SEC.) = 1.37
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) = 21.61

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.48
HALFSTREET FLOOD WIDTH(FEET) = 17.54
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.67
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.75
STREET FLOW TRAVEL TIME(MIN.) = 1.77 Tc(MIN.) = 8.27

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.044 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 like ".4 DWELLING/ACRE".

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.205
SUBAREA AREA(ACRES) = 6.10 SUBAREA RUNOFF(CFS) = 16.37
EFFECTIVE AREA(ACRES) = 10.50 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.27
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 28.00

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 19.49
FLOW VELOCITY(FEET/SEC.) = 3.90 DEPTH*VELOCITY(FT*FT/SEC.) = 1.99
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 14.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.35
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 28.00
PIPE TRAVEL TIME(MIN.) = 0.86 Tc(MIN.) = 9.12
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.) = 9.12
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.876 E-3

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 like ".4 DWELLING/ACRE".

FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.12
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.876 E-4

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 like ".4 DWELLING/ACRE".

EFFECTIVE AREA (ACRES) = 55.70 AREA-AVERAGED Fm (INCH/HR) = 0.08
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.28
TOTAL AREA (ACRES) = 55.7 PEAK FLOW RATE (CFS) = 139.97

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.) = 9.12
RAINFALL INTENSITY (INCH/HR) = 2.88
AREA-AVERAGED Fm (INCH/HR) = 0.08
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.28
EFFECTIVE STREAM AREA (ACRES) = 55.70
TOTAL STREAM AREA (ACRES) = 55.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 139.97

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
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.875

OE-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"	B	0.10	0.30	1.000	63	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	B	0.10	0.30	1.000	66	9.13
NATURAL FAIR COVER						
"CHAPARRAL, BROADLEAF"	B	0.20	0.30	1.000	63	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	B	0.50	0.30	1.000	66	9.13

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 2.09
TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 2.09

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

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.658

OE-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"	B	2.10	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	3.10	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.20	0.30	1.000	66

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 11.01
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 8.65
AVERAGE FLOW DEPTH (FEET) = 0.65 TRAVEL TIME (MIN.) = 1.34
Tc (MIN.) = 10.47
SUBAREA AREA (ACRES) = 8.40 SUBAREA RUNOFF (CFS) = 17.83
EFFECTIVE AREA (ACRES) = 9.30 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 9.3 PEAK FLOW RATE (CFS) = 19.74

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.81 FLOW VELOCITY (FEET/SEC.) = 9.99
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
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.352

OE-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					
"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"	B	1.20	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	5.80	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	6.30	0.30	1.000	66

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 33.05
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.76
AVERAGE FLOW DEPTH (FEET) = 1.28 TRAVEL TIME (MIN.) = 2.49
Tc (MIN.) = 12.96
SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 26.60

EFFECTIVE AREA(ACRES) = 23.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 23.7 PEAK FLOW RATE(CFS) = 43.77

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.42 FLOW VELOCITY(FEET/SEC.) = 7.22
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.) = 12.96
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.352
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 10.40 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 19.21
EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 34.1 PEAK FLOW RATE(CFS) = 62.98

OE-3

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 27.0 INCH PIPE IS 19.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.30
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 62.98
PIPE TRAVEL TIME(MIN.) = 0.86 Tc(MIN.) = 13.82
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.) = 13.82
RAINFALL INTENSITY(INCH/HR) = 2.27
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 34.10
TOTAL STREAM AREA(ACRES) = 34.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 62.98

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	139.97	9.12	2.876	0.30(0.08)	0.28	55.7	800.00
2	62.98	13.82	2.267	0.30(0.30)	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	194.42	9.12	2.876	0.30(0.15)	0.49	78.2	800.00
2	172.43	13.82	2.267	0.30(0.17)	0.55	89.8	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 194.42 Tc(MIN.) = 9.12
EFFECTIVE AREA(ACRES) = 78.22 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 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 39.0 INCH PIPE IS 29.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 29.36
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 194.42
PIPE TRAVEL TIME(MIN.) = 0.43 Tc(MIN.) = 9.55
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.) = 9.55
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.801
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 5.60 0.30 0.200 56
APARTMENTS B 12.30 0.30 0.200 56
COMMERCIAL B 0.50 0.30 0.100 56
COMMERCIAL B 5.40 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.70 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.20 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.372

E-5

SUBAREA AREA (ACRES) = 32.70 SUBAREA RUNOFF (CFS) = 79.15
EFFECTIVE AREA (ACRES) = 110.92 AREA-AVERAGED Fm (INCH/HR) = 0.14
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
TOTAL AREA (ACRES) = 122.5 PEAK FLOW RATE (CFS) = 266.05

FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 9.55
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.801 **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 B 9.90 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA (ACRES) = 9.90 SUBAREA RUNOFF (CFS) = 24.69
EFFECTIVE AREA (ACRES) = 120.82 AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
TOTAL AREA (ACRES) = 132.4 PEAK FLOW RATE (CFS) = 290.74

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.) = 9.55
RAINFALL INTENSITY (INCH/HR) = 2.80
AREA-AVERAGED Fm (INCH/HR) = 0.13
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA (ACRES) = 120.82
TOTAL STREAM AREA (ACRES) = 132.40
PEAK FLOW RATE (CFS) AT CONFLUENCE = 290.74

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
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.924
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" B 0.10 0.30 1.000 63 8.86
NATURAL FAIR COVER
"OPEN BRUSH" B 0.30 0.30 1.000 66 8.86

NATURAL FAIR COVER
"CHAPARRAL, BROADLEAF" B 0.60 0.30 1.000 63 8.86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 2.36
TOTAL AREA (ACRES) = 1.00 PEAK FLOW RATE (CFS) = 2.36

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**
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.455

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.10 0.30 0.100 56
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" B 0.80 0.30 1.000 66
NATURAL FAIR COVER
"OPEN BRUSH" B 2.40 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL, BROADLEAF" B 3.20 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.845
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 11.03
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.15
AVERAGE FLOW DEPTH (FEET) = 0.77 TRAVEL TIME (MIN.) = 3.16
Tc (MIN.) = 12.03
SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 17.24
EFFECTIVE AREA (ACRES) = 9.70 AREA-AVERAGED Fm (INCH/HR) = 0.26
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.86
TOTAL AREA (ACRES) = 9.7 PEAK FLOW RATE (CFS) = 19.18

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.95 FLOW VELOCITY (FEET/SEC.) = 7.07
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.) = 12.03
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.455 **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" B 7.10 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 21.53
 EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94
 TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 40.70

 FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 12.03
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.455
 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"	B	1.80	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	3.60	0.30	1.000	63
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) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.913					
SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 20.41					
EFFECTIVE AREA(ACRES) = 31.20 AREA-AVERAGED Fm(INCH/HR) = 0.28					
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.93					
TOTAL AREA(ACRES) = 31.2 PEAK FLOW RATE(CFS) = 61.11					

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 FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 12.03
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.455
 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	4.60	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.60	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.997					
SUBAREA AREA(ACRES) = 7.40 SUBAREA RUNOFF(CFS) = 14.36					
EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.28					
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94					

OE-6

TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 75.47

 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 30.0 INCH PIPE IS 22.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.00
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 75.47
 PIPE TRAVEL TIME(MIN.) = 1.08 Tc(MIN.) = 13.11
 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.) = 13.11
 RAINFALL INTENSITY(INCH/HR) = 2.34
 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.94
 EFFECTIVE STREAM AREA(ACRES) = 38.60
 TOTAL STREAM AREA(ACRES) = 38.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 75.47

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	290.74	9.55	2.801	0.30(0.13)	0.42	120.8	800.00
1	248.28	14.27	2.226	0.30(0.14)	0.47	132.4	810.00
2	75.47	13.11	2.337	0.30(0.28)	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	358.18	9.55	2.801	0.30(0.16)	0.52	148.9	800.00
2	334.19	13.11	2.337	0.30(0.17)	0.57	168.2	818.00
3	319.69	14.27	2.226	0.30(0.17)	0.58	171.0	810.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 358.18 Tc(MIN.) = 9.55
 EFFECTIVE AREA(ACRES) = 148.95 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 9.55
EFFECTIVE AREA (ACRES) = 148.95 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.522
PEAK FLOW RATE (CFS) = 358.18

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	358.18	9.55	2.801	0.30 (0.16)	0.52	148.9	800.00
2	334.19	13.11	2.337	0.30 (0.17)	0.57	168.2	818.00
3	319.69	14.27	2.226	0.30 (0.17)	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 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 50-YR EV JUNE 2018 JMITAL *

FILE NAME: PA4E50EV.DAT
TIME/DATE OF STUDY: 10:12 06/03/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 15.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 4.440
- 2) 10.00; 3.010
- 3) 15.00; 2.390
- 4) 20.00; 2.030
- 5) 25.00; 1.790
- 6) 30.00; 1.600
- 7) 40.00; 1.370
- 8) 50.00; 1.200
- 9) 60.00; 1.060
- 10) 90.00; 0.860
- 11) 120.00; 0.730
- 12) 180.00; 0.590
- 13) 360.00; 0.410
- 14) 1200.00; 0.170

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 HIKE (FT) (FT) (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:

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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 4.440
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"	B	0.20	0.30	0.900	56	8.00
COMMERCIAL	B	0.80	0.30	0.100	56	5.00
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56	8.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA RUNOFF(CFS) = 5.80
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 5.80

E-1

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) = 10.94
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.40
HALFSTREET FLOOD WIDTH(FEET) = 13.32
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.08
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.23
STREET FLOW TRAVEL TIME(MIN.) = 1.46 Tc(MIN.) = 6.46

* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 4.022

E-2

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
COMMERCIAL	B	2.10	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.293
SUBAREA AREA (ACRES) = 2.90 SUBAREA RUNOFF (CFS) = 10.27
EFFECTIVE AREA (ACRES) = 4.40 AREA-AVERAGED Fm (INCH/HR) = 0.11
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.35
TOTAL AREA (ACRES) = 4.4 PEAK FLOW RATE (CFS) = 15.50

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.44 HALFSTREET FLOOD WIDTH (FEET) = 15.43
FLOW VELOCITY (FEET/SEC.) = 3.34 DEPTH*VELOCITY (FT*FT/SEC.) = 1.46
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 (curb-to-curb) = 0.0150

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 25.04

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH (FEET) = 0.50

HALFSTREET FLOOD WIDTH (FEET) = 18.63

AVERAGE FLOW VELOCITY (FEET/SEC.) = 3.80

PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.88

STREET FLOW TRAVEL TIME (MIN.) = 1.71 Tc (MIN.) = 8.18

* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 3.531

E-2.1

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	0.20	0.30	0.900	56
COMMERCIAL	B	3.00	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.10	0.30	0.900	56
COMMERCIAL	B	1.70	0.30	0.100	56
RESIDENTIAL					

".4 DWELLING/ACRE" B 0.50 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.205

SUBAREA AREA (ACRES) = 6.10 SUBAREA RUNOFF (CFS) = 19.05

EFFECTIVE AREA (ACRES) = 10.50 AREA-AVERAGED Fm (INCH/HR) = 0.08

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.27

TOTAL AREA (ACRES) = 10.5 PEAK FLOW RATE (CFS) = 32.61

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.53 HALFSTREET FLOOD WIDTH (FEET) = 20.74

FLOW VELOCITY (FEET/SEC.) = 4.04 DEPTH*VELOCITY (FT*FT/SEC.) = 2.15

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 15.9 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 16.74

ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 32.61

PIPE TRAVEL TIME (MIN.) = 0.84 Tc (MIN.) = 9.02

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.) = 9.02

* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 3.291

E-3

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	2.00	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.20	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	4.20	0.30	0.900	56
COMMERCIAL	B	5.30	0.30	0.100	56
COMMERCIAL	B	7.10	0.30	0.100	56
COMMERCIAL	B	8.60	0.30	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.329
SUBAREA AREA (ACRES) = 29.40 SUBAREA RUNOFF (CFS) = 84.48
EFFECTIVE AREA (ACRES) = 39.90 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
TOTAL AREA (ACRES) = 39.9 PEAK FLOW RATE (CFS) = 114.82

FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

```

=====
MAINLINE Tc(MIN.) = 9.02
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.291
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"   B         0.60   0.30   0.900  56
RESIDENTIAL
".4 DWELLING/ACRE"   B         1.30   0.30   0.900  56
COMMERCIAL           B         5.60   0.30   0.100  56
COMMERCIAL           B         8.30   0.30   0.100  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA(ACRES) = 15.80   SUBAREA RUNOFF(CFS) = 45.97
EFFECTIVE AREA(ACRES) = 55.70   AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 55.7   PEAK FLOW RATE(CFS) = 160.79

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E-4

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*****
FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 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.) = 9.02
RAINFALL INTENSITY(INCH/HR) = 3.29
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.28
EFFECTIVE STREAM AREA(ACRES) = 55.70
TOTAL STREAM AREA(ACRES) = 55.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 160.79

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*****
FLOW PROCESS FROM NODE 810.00 TO NODE 811.00 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) = 307.00
ELEVATION DATA: UPSTREAM(FEET) = 785.00   DOWNSTREAM(FEET) = 705.00

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Tc = K*[ (LENGTH** 3.00)/(ELEVATION CHANGE) ]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.130
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.259
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" B         0.10   0.30   1.000  63   9.13
NATURAL FAIR COVER
"OPEN BRUSH"         B         0.10   0.30   1.000  66   9.13
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B         0.20   0.30   1.000  63   9.13
NATURAL FAIR COVER
"OPEN BRUSH"         B         0.50   0.30   1.000  66   9.13

```

OE-1

```

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 2.40
TOTAL AREA(ACRES) = 0.90   PEAK FLOW RATE(CFS) = 2.40

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*****
FLOW PROCESS FROM NODE 811.00 TO NODE 812.00 IS CODE = 51
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>>>>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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.957
SUBAREA LOSS RATE DATA(AMC II):

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OE-2

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DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"OPEN BRUSH"         B         2.10   0.30   1.000  66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B         3.10   0.30   1.000  63
NATURAL FAIR COVER
"OPEN BRUSH"         B         3.20   0.30   1.000  66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.93
AVERAGE FLOW DEPTH(FEET) = 0.68   TRAVEL TIME(MIN.) = 1.30
Tc(MIN.) = 10.43
SUBAREA AREA(ACRES) = 8.40   SUBAREA RUNOFF(CFS) = 20.09
EFFECTIVE AREA(ACRES) = 9.30   AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 9.3   PEAK FLOW RATE(CFS) = 22.24

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.85   FLOW VELOCITY(FEET/SEC.) = 10.27
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 812.00 = 1002.00 FEET.

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*****
FLOW PROCESS FROM NODE 812.00 TO NODE 813.00 IS CODE = 51
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```

>>>>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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.658
SUBAREA LOSS RATE DATA(AMC II):

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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" 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" B 1.20 0.30 1.000 63
 NATURAL FAIR COVER
 "OPEN BRUSH" B 5.80 0.30 1.000 66
 NATURAL FAIR COVER
 "OPEN BRUSH" B 6.30 0.30 1.000 66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 37.55
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.97
 AVERAGE FLOW DEPTH(FEET) = 1.34 TRAVEL TIME(MIN.) = 2.41
 Tc(MIN.) = 12.84
 SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 30.55
 EFFECTIVE AREA(ACRES) = 23.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 23.7 PEAK FLOW RATE(CFS) = 50.29

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.50 FLOW VELOCITY(FEET/SEC.) = 7.47
 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.) = 12.84
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.658
 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	10.40	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 22.07
 EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 34.1 PEAK FLOW RATE(CFS) = 72.35

OE-3

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 19.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 21.25
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 72.35
 PIPE TRAVEL TIME(MIN.) = 0.82 Tc(MIN.) = 13.66
 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.) = 13.66
 RAINFALL INTENSITY(INCH/HR) = 2.56
 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA(ACRES) = 34.10
 TOTAL STREAM AREA(ACRES) = 34.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 72.35

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	160.79	9.02	3.291	0.30(0.08)	0.28	55.7	800.00
2	72.35	13.66	2.556	0.30(0.30)	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	224.10	9.02	3.291	0.30(0.15)	0.49	78.2	800.00
2	196.27	13.66	2.556	0.30(0.17)	0.55	89.8	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 224.10 Tc(MIN.) = 9.02
 EFFECTIVE AREA(ACRES) = 78.20 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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 29.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 30.60
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 224.10
 PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 9.43
 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.) = 9.43
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.174 E-5

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 5.60 0.30 0.200 56
APARTMENTS B 12.30 0.30 0.200 56
COMMERCIAL B 0.50 0.30 0.100 56
COMMERCIAL B 5.40 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.70 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.20 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.372
SUBAREA AREA(ACRES) = 32.70 SUBAREA RUNOFF(CFS) = 90.11
EFFECTIVE AREA(ACRES) = 110.90 AREA-AVERAGED Fm(INCH/HR) = 0.14
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
TOTAL AREA(ACRES) = 122.5 PEAK FLOW RATE(CFS) = 303.19

FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 9.43
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.174 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 B 9.90 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 9.90 SUBAREA RUNOFF(CFS) = 28.01
EFFECTIVE AREA(ACRES) = 120.80 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 132.4 PEAK FLOW RATE(CFS) = 331.20

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.) = 9.43
RAINFALL INTENSITY(INCH/HR) = 3.17
AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA(ACRES) = 120.80
TOTAL STREAM AREA(ACRES) = 132.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 331.20

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 OE-4

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.335
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" B 0.10 0.30 1.000 63 8.86
NATURAL FAIR COVER
"OPEN BRUSH" B 0.30 0.30 1.000 66 8.86
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 0.60 0.30 1.000 63 8.86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 2.73
TOTAL AREA(ACRES) = 1.00 PEAK FLOW RATE(CFS) = 2.73

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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.772 OE-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 0.10 0.30 0.100 56
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" B 0.80 0.30 1.000 66
NATURAL FAIR COVER
"OPEN BRUSH" B 2.40 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 3.20 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.845
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.64
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.37
AVERAGE FLOW DEPTH(FEET) = 0.81 TRAVEL TIME(MIN.) = 3.05
Tc(MIN.) = 11.92
SUBAREA AREA(ACRES) = 8.70 SUBAREA RUNOFF(CFS) = 19.72
EFFECTIVE AREA(ACRES) = 9.70 AREA-AVERAGED Fm(INCH/HR) = 0.26
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.86
TOTAL AREA(ACRES) = 9.7 PEAK FLOW RATE(CFS) = 21.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.00 FLOW VELOCITY(FEET/SEC.) = 7.28
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.) = 11.92
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.772 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" B 7.10 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 24.70
EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94
TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 46.64

FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 11.92
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.772 OE-6
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 3.40 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 1.80 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 3.60 0.30 1.000 63
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) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.913
SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 23.38
EFFECTIVE AREA(ACRES) = 31.20 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.93
TOTAL AREA(ACRES) = 31.2 PEAK FLOW RATE(CFS) = 70.02

FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 11.92

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.772 OE-6

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" B 4.60 0.30 1.000 66
NATURAL FAIR COVER
"OPEN BRUSH" B 2.60 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 0.20 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.997
SUBAREA AREA(ACRES) = 7.40 SUBAREA RUNOFF(CFS) = 16.47
EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94
TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 86.49

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 22.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.90
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 86.49
PIPE TRAVEL TIME(MIN.) = 1.03 Tc(MIN.) = 12.95
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.) = 12.95
RAINFALL INTENSITY(INCH/HR) = 2.64
AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.94
EFFECTIVE STREAM AREA(ACRES) = 38.60
TOTAL STREAM AREA(ACRES) = 38.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 86.49

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	331.20	9.43	3.174	0.30(0.13)	0.42	120.8	800.00
1	281.25	14.09	2.503	0.30(0.14)	0.47	132.4	810.00
2	86.49	12.95	2.644	0.30(0.28)	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	408.29	9.43	3.174	0.30 (0.16)	0.52	148.9	800.00
2	379.97	12.95	2.644	0.30 (0.17)	0.57	168.2	818.00
3	362.57	14.09	2.503	0.30 (0.17)	0.58	171.0	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 408.29 Tc(MIN.) = 9.43
EFFECTIVE AREA(ACRES) = 148.91 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.52
TOTAL AREA(ACRES) = 171.0
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 817.00 = 3814.00 FEET.

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END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 171.0 TC(MIN.) = 9.43
EFFECTIVE AREA(ACRES) = 148.91 AREA-AVERAGED Fm(INCH/HR) = 0.16
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.522
PEAK FLOW RATE(CFS) = 408.29

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	408.29	9.43	3.174	0.30 (0.16)	0.52	148.9	800.00
2	379.97	12.95	2.644	0.30 (0.17)	0.57	168.2	818.00
3	362.57	14.09	2.503	0.30 (0.17)	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 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 100-YR EV JUNE 2018 JMITAL *

FILE NAME: PA4E00EV.DAT
TIME/DATE OF STUDY: 10:08 06/03/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 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 LIP HIKE (FT) (FT) (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 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 E-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.)
RESIDENTIAL						
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56	8.00
COMMERCIAL	B	0.80	0.30	0.100	56	5.00
RESIDENTIAL						
".4 DWELLING/ACRE"	B	0.50	0.30	0.900	56	8.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.473
SUBAREA RUNOFF(CFS) = 6.32
TOTAL AREA(ACRES) = 1.50 PEAK FLOW RATE(CFS) = 6.32

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) = 11.67

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.41
HALFSTREET FLOOD WIDTH(FEET) = 13.71
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.12
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.27
STREET FLOW TRAVEL TIME(MIN.) = 1.44 Tc(MIN.) = 6.44 E-2
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.179

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.10	0.30	0.100	56
COMMERCIAL	B	2.10	0.30	0.100	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.293
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 10.68
EFFECTIVE AREA(ACRES) = 4.40 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 4.4 PEAK FLOW RATE(CFS) = 16.13

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.66
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) = 26.01

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 18.95
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.) = 8.15

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.659

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 like ".4 DWELLING/ACRE".

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.205
SUBAREA AREA(ACRES) = 6.10 SUBAREA RUNOFF(CFS) = 19.75
EFFECTIVE AREA(ACRES) = 10.50 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.27
TOTAL AREA(ACRES) = 10.5 PEAK FLOW RATE(CFS) = 33.82

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.54 HALFSTREET FLOOD WIDTH(FEET) = 21.05
FLOW VELOCITY(FEET/SEC.) = 4.07 DEPTH*VELOCITY(FT*FT/SEC.) = 2.19
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 16.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.79
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 33.82
PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 8.98
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.) = 8.98
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.462
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" B 2.00 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.20 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.20 0.30 0.900 56
COMMERCIAL B 5.30 0.30 0.100 56
COMMERCIAL B 7.10 0.30 0.100 56
COMMERCIAL B 8.60 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.329
SUBAREA AREA(ACRES) = 29.40 SUBAREA RUNOFF(CFS) = 89.00
EFFECTIVE AREA(ACRES) = 39.90 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.31
TOTAL AREA(ACRES) = 39.9 PEAK FLOW RATE(CFS) = 120.96

E-3

FLOW PROCESS FROM NODE 808.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.98
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.462
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" B 0.60 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 1.30 0.30 0.900 56
COMMERCIAL B 5.60 0.30 0.100 56
COMMERCIAL B 8.30 0.30 0.100 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA(ACRES) = 15.80 SUBAREA RUNOFF(CFS) = 48.40

E-4

EFFECTIVE AREA (ACRES) = 55.70 AREA-AVERAGED Fm (INCH/HR) = 0.08
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.28
 TOTAL AREA (ACRES) = 55.7 PEAK FLOW RATE (CFS) = 169.36

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.) = 8.98
 RAINFALL INTENSITY (INCH/HR) = 3.46
 AREA-AVERAGED Fm (INCH/HR) = 0.08
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.28
 EFFECTIVE STREAM AREA (ACRES) = 55.70
 TOTAL STREAM AREA (ACRES) = 55.70
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 169.36

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

OE-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"	B	0.10	0.30	1.000	63	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	B	0.10	0.30	1.000	66	9.13
NATURAL FAIR COVER						
"CHAPARRAL, BROADLEAF"	B	0.20	0.30	1.000	63	9.13
NATURAL FAIR COVER						
"OPEN BRUSH"	B	0.50	0.30	1.000	66	9.13
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000						
SUBAREA RUNOFF (CFS) = 2.54						
TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 2.54						

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) = 3.185

OE-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"	B	2.10	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	3.10	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.20	0.30	1.000	66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 13.46					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 9.03					
AVERAGE FLOW DEPTH (FEET) = 0.70 TRAVEL TIME (MIN.) = 1.28					
Tc (MIN.) = 10.41					
SUBAREA AREA (ACRES) = 8.40 SUBAREA RUNOFF (CFS) = 21.81					
EFFECTIVE AREA (ACRES) = 9.30 AREA-AVERAGED Fm (INCH/HR) = 0.30					
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00					
TOTAL AREA (ACRES) = 9.3 PEAK FLOW RATE (CFS) = 24.14					

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.87 FLOW VELOCITY (FEET/SEC.) = 10.52
 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) = 2.837

OE-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					
"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"	B	1.20	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	5.80	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	6.30	0.30	1.000	66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 40.60					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.13					
AVERAGE FLOW DEPTH (FEET) = 1.38 TRAVEL TIME (MIN.) = 2.36					
Tc (MIN.) = 12.77					
SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 32.88					

EFFECTIVE AREA(ACRES) = 23.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 23.7 PEAK FLOW RATE(CFS) = 54.11

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.54 FLOW VELOCITY(FEET/SEC.) = 7.64
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.) = 12.77
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.837
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 10.40 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 23.74
EFFECTIVE AREA(ACRES) = 34.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 34.1 PEAK FLOW RATE(CFS) = 77.85

OE-3

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 20.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.54
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 77.85
PIPE TRAVEL TIME(MIN.) = 0.81 Tc(MIN.) = 13.58
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.) = 13.58
RAINFALL INTENSITY(INCH/HR) = 2.74
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 34.10
TOTAL STREAM AREA(ACRES) = 34.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 77.85

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	169.36	8.98	3.462	0.30(0.08)	0.28	55.7	800.00
2	77.85	13.58	2.740	0.30(0.30)	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	236.09	8.98	3.462	0.30(0.15)	0.49	78.3	800.00
2	210.99	13.58	2.740	0.30(0.17)	0.55	89.8	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 236.09 Tc(MIN.) = 8.98
EFFECTIVE AREA(ACRES) = 78.25 AREA-AVERAGED Fm(INCH/HR) = 0.15
AREA-AVERAGED Fp(INCH/HR) = 0.30 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 31.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.83
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 236.09
PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 9.39
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.) = 9.39
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.376
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
APARTMENTS B 5.60 0.30 0.200 56
APARTMENTS B 12.30 0.30 0.200 56
COMMERCIAL B 0.50 0.30 0.100 56
COMMERCIAL B 5.40 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.70 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 4.20 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.372

E-5

SUBAREA AREA (ACRES) = 32.70 SUBAREA RUNOFF (CFS) = 96.07
 EFFECTIVE AREA (ACRES) = 110.95 AREA-AVERAGED Fm (INCH/HR) = 0.14
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.45
 TOTAL AREA (ACRES) = 122.5 PEAK FLOW RATE (CFS) = 323.55

 FLOW PROCESS FROM NODE 809.00 TO NODE 809.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc (MIN.) = 9.39
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.376 **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 B 9.90 0.30 0.100 56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA (ACRES) = 9.90 SUBAREA RUNOFF (CFS) = 29.81
 EFFECTIVE AREA (ACRES) = 120.85 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.42
 TOTAL AREA (ACRES) = 132.4 PEAK FLOW RATE (CFS) = 353.36

 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.) = 9.39
 RAINFALL INTENSITY (INCH/HR) = 3.38
 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.42
 EFFECTIVE STREAM AREA (ACRES) = 120.85
 TOTAL STREAM AREA (ACRES) = 132.40
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 353.36

 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 **OE-4**
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.488
 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" B 0.10 0.30 1.000 63 8.86
 NATURAL FAIR COVER
 "OPEN BRUSH" B 0.30 0.30 1.000 66 8.86

NATURAL FAIR COVER
 "CHAPARRAL, BROADLEAF" B 0.60 0.30 1.000 63 8.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF (CFS) = 2.87
 TOTAL AREA (ACRES) = 1.00 PEAK FLOW RATE (CFS) = 2.87

 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) = 2.957

SUBAREA LOSS RATE DATA (AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 COMMERCIAL B 0.10 0.30 0.100 56
 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" B 0.80 0.30 1.000 66
 NATURAL FAIR COVER
 "OPEN BRUSH" B 2.40 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL, BROADLEAF" B 3.20 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.845
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 13.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.47
 AVERAGE FLOW DEPTH (FEET) = 0.83 TRAVEL TIME (MIN.) = 3.01
 Tc (MIN.) = 11.87
 SUBAREA AREA (ACRES) = 8.70 SUBAREA RUNOFF (CFS) = 21.17
 EFFECTIVE AREA (ACRES) = 9.70 AREA-AVERAGED Fm (INCH/HR) = 0.26
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.86
 TOTAL AREA (ACRES) = 9.7 PEAK FLOW RATE (CFS) = 23.56

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 1.03 FLOW VELOCITY (FEET/SEC.) = 7.44
 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.) = 11.87
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.957 **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" B 7.10 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 11.10 SUBAREA RUNOFF(CFS) = 26.54
 EFFECTIVE AREA(ACRES) = 20.80 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94
 TOTAL AREA(ACRES) = 20.8 PEAK FLOW RATE(CFS) = 50.10

 FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 11.87
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.957 **OE-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					
"CHAPARRAL,BROADLEAF"	B	3.40	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	1.80	0.30	1.000	63
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	3.60	0.30	1.000	63
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) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.913
 SUBAREA AREA(ACRES) = 10.40 SUBAREA RUNOFF(CFS) = 25.11
 EFFECTIVE AREA(ACRES) = 31.20 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.93
 TOTAL AREA(ACRES) = 31.2 PEAK FLOW RATE(CFS) = 75.21

 FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 11.87
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.957 **OE-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"	B	4.60	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.60	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.20	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.997
 SUBAREA AREA(ACRES) = 7.40 SUBAREA RUNOFF(CFS) = 17.70
 EFFECTIVE AREA(ACRES) = 38.60 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94

TOTAL AREA(ACRES) = 38.6 PEAK FLOW RATE(CFS) = 92.91

 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 23.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.13
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 92.91
 PIPE TRAVEL TIME(MIN.) = 1.02 Tc(MIN.) = 12.89
 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.) = 12.89
 RAINFALL INTENSITY(INCH/HR) = 2.82
 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.94
 EFFECTIVE STREAM AREA(ACRES) = 38.60
 TOTAL STREAM AREA(ACRES) = 38.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 92.91

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	353.36	9.39	3.376	0.30(0.13)	0.42	120.9	800.00
1	303.84	14.01	2.692	0.30(0.14)	0.47	132.4	810.00
2	92.91	12.89	2.822	0.30(0.28)	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	435.82	9.39	3.376	0.30(0.16)	0.52	149.0	800.00
2	408.74	12.89	2.822	0.30(0.17)	0.57	168.2	818.00
3	392.00	14.01	2.692	0.30(0.17)	0.58	171.0	810.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 435.82 Tc(MIN.) = 9.39
 EFFECTIVE AREA(ACRES) = 148.97 AREA-AVERAGED Fm(INCH/HR) = 0.16
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 9.39
EFFECTIVE AREA (ACRES) = 148.97 AREA-AVERAGED Fm (INCH/HR) = 0.16
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.522
PEAK FLOW RATE (CFS) = 435.82

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	435.82	9.39	3.376	0.30 (0.16)	0.52	149.0	800.00
2	408.74	12.89	2.822	0.30 (0.17)	0.57	168.2	818.00
3	392.00	14.01	2.692	0.30 (0.17)	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:

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5 Hutton Centre Drive, Suite 500
Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-4 SUBAREA F *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 2-YR EV AUG 2018 CCHI *

FILE NAME: PA4F02EV.DAT
TIME/DATE OF STUDY: 15:47 08/07/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 1.600
- 2) 10.00; 1.060
- 3) 15.00; 0.840
- 4) 20.00; 0.720
- 5) 25.00; 0.630
- 6) 30.00; 0.560
- 7) 40.00; 0.480
- 8) 50.00; 0.420
- 9) 60.00; 0.366
- 10) 90.00; 0.300
- 11) 120.00; 0.246
- 12) 180.00; 0.190
- 13) 360.00; 0.136
- 14) 1200.00; 0.080

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-	CROWN TO	STREET-CROSSFALL:		CURB HEIGHT (FT)	GUTTER-GEOMETRIES:			MANNING (n)
	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / SIDE/ WAY		WIDTH (FT)	LIP (FT)	HIKE (FT)	
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
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.894

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"	-	0.70	0.60	1.000	0	13.76
NATURAL FAIR COVER "OPEN BRUSH"	-	0.50	0.60	1.000	0	13.76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.32
TOTAL AREA(ACRES) = 1.20 PEAK FLOW RATE(CFS) = 0.32

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 1.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.49
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.32
PIPE TRAVEL TIME(MIN.) = 5.20 Tc(MIN.) = 18.96
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.) = 18.96
RAINFALL INTENSITY(INCH/HR) = 0.74
AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60

AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA (ACRES) = 1.20
TOTAL STREAM AREA (ACRES) = 1.20
PEAK FLOW RATE (CFS) AT CONFLUENCE = 0.32

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
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.261

OF-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"	-	0.10	0.60	1.000	0	8.14
NATURAL FAIR COVER						
"CHAPARRAL, BROADLEAF"	-	0.50	0.60	1.000	0	8.14
NATURAL FAIR COVER						
"OPEN BRUSH"	-	1.00	0.60	1.000	0	8.14

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF (CFS) = 0.95

TOTAL AREA (ACRES) = 1.60 PEAK FLOW RATE (CFS) = 0.95

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

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.097

OF-2

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.00	0.60	1.000	-
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	2.30	0.60	1.000	-
USER-DEFINED	-	1.00	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 2.06

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.04

AVERAGE FLOW DEPTH (FEET) = 0.37 TRAVEL TIME (MIN.) = 1.51

Tc (MIN.) = 9.66

SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 2.19

EFFECTIVE AREA (ACRES) = 6.50 AREA-AVERAGED Fm (INCH/HR) = 0.60

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 6.5 PEAK FLOW RATE (CFS) = 2.91

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 0.42 FLOW VELOCITY (FEET/SEC.) = 5.58

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

* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.983

OF-3

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	4.60	0.60	1.000	-
USER-DEFINED	-	4.00	0.60	1.000	-
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	2.70	0.60	1.000	-
USER-DEFINED	-	5.10	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60

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.) = 4.94

AVERAGE FLOW DEPTH (FEET) = 0.63 TRAVEL TIME (MIN.) = 2.09

Tc (MIN.) = 11.74

SUBAREA AREA (ACRES) = 17.10 SUBAREA RUNOFF (CFS) = 5.90

EFFECTIVE AREA (ACRES) = 23.60 AREA-AVERAGED Fm (INCH/HR) = 0.60

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 23.6 PEAK FLOW RATE (CFS) = 8.15

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 0.71 FLOW VELOCITY (FEET/SEC.) = 5.35

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 18.0 INCH PIPE IS 11.5 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 6.86

ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 8.15

PIPE TRAVEL TIME (MIN.) = 2.16 Tc (MIN.) = 13.90

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.) = 13.90
RAINFALL INTENSITY(INCH/HR) = 0.89
AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 23.60
TOTAL STREAM AREA(ACRES) = 23.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.15

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.32	18.96	0.745	0.60(0.60)	1.00	1.2	900.00
2	8.15	13.90	0.888	0.60(0.60)	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	8.46	13.90	0.888	0.60(0.60)	1.00	24.5	910.00
2	4.42	18.96	0.745	0.60(0.60)	1.00	24.8	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 8.46 Tc(MIN.) = 13.90
EFFECTIVE AREA(ACRES) = 24.48 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 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.) = 13.90
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.888

F-2

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.20 0.60 1.000 -
USER-DEFINED - 5.50 0.60 0.100 -
USER-DEFINED - 0.20 0.60 1.000 -
USER-DEFINED - 0.10 0.60 0.900 -
USER-DEFINED - 0.10 0.60 1.000 -
USER-DEFINED - 1.00 0.60 0.100 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.175
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 5.01
EFFECTIVE AREA(ACRES) = 31.58 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.81

TOTAL AREA(ACRES) = 31.9 PEAK FLOW RATE(CFS) = 11.36

FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 13.90
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.888

F-2

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.20 0.60 1.000 -
USER-DEFINED - 0.10 0.60 0.900 -
USER-DEFINED - 3.20 0.60 1.000 -
USER-DEFINED - 3.40 0.60 0.100 -
USER-DEFINED - 3.30 0.60 1.000 -
USER-DEFINED - 0.70 0.60 0.900 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.712
SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 4.52
EFFECTIVE AREA(ACRES) = 42.48 AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.79
TOTAL AREA(ACRES) = 42.8 PEAK FLOW RATE(CFS) = 15.88

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 18.0 INCH PIPE IS 11.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.74
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.88
PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 14.70
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.) = 14.70
RAINFALL INTENSITY(INCH/HR) = 0.85
AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.79
EFFECTIVE STREAM AREA(ACRES) = 42.48
TOTAL STREAM AREA(ACRES) = 42.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.88

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
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.304

OF-4

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"	-	0.20	0.60	1.000	0	7.74
NATURAL FAIR COVER "OPEN BRUSH"	-	0.70	0.60	1.000	0	7.74

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 0.57
TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 0.57

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
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.123

OF-5

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.60	1.000	-
USER-DEFINED	-	1.00	0.60	1.000	-
USER-DEFINED	-	1.40	0.60	1.000	-
USER-DEFINED	-	4.40	0.60	1.000	-
USER-DEFINED	-	6.70	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.87
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.89
AVERAGE FLOW DEPTH (FEET) = 0.47 TRAVEL TIME (MIN.) = 1.68
Tc (MIN.) = 9.42
SUBAREA AREA (ACRES) = 13.70 SUBAREA RUNOFF (CFS) = 6.45
EFFECTIVE AREA (ACRES) = 14.60 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 14.6 PEAK FLOW RATE (CFS) = 6.87

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.58 FLOW VELOCITY (FEET/SEC.) = 6.88
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
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.001

OF-6

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.70	0.60	1.000	-
USER-DEFINED	-	1.40	0.60	1.000	-
USER-DEFINED	-	5.40	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 8.23
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.26
AVERAGE FLOW DEPTH (FEET) = 0.72 TRAVEL TIME (MIN.) = 1.91
Tc (MIN.) = 11.33
SUBAREA AREA (ACRES) = 7.50 SUBAREA RUNOFF (CFS) = 2.71
EFFECTIVE AREA (ACRES) = 22.10 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 22.1 PEAK FLOW RATE (CFS) = 7.99

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.71 FLOW VELOCITY (FEET/SEC.) = 5.22
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
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.877

OF-7

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	0.80	0.60	1.000	-
USER-DEFINED	-	0.80	0.60	1.000	-
USER-DEFINED	-	1.10	0.60	1.000	-
USER-DEFINED	-	5.20	0.60	1.000	-
USER-DEFINED	-	6.30	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 9.85
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.99
AVERAGE FLOW DEPTH (FEET) = 0.81 TRAVEL TIME (MIN.) = 2.84
Tc (MIN.) = 14.17
SUBAREA AREA (ACRES) = 14.80 SUBAREA RUNOFF (CFS) = 3.69
EFFECTIVE AREA (ACRES) = 36.90 AREA-AVERAGED Fm (INCH/HR) = 0.60

AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 36.9 PEAK FLOW RATE (CFS) = 9.19

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.79 FLOW VELOCITY (FEET/SEC.) = 4.92
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.) = 14.17 **OF-7**
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.877
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	9.70	0.60	1.000	-
USER-DEFINED	-	17.00	0.60	1.000	-
USER-DEFINED	-	36.60	0.60	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 63.30 SUBAREA RUNOFF (CFS) = 15.76
EFFECTIVE AREA (ACRES) = 100.20 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 100.2 PEAK FLOW RATE (CFS) = 24.95

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 **OF-8**
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.821
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.30	0.60	1.000	-
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	0.70	0.60	1.000	-
USER-DEFINED	-	0.90	0.60	1.000	-
USER-DEFINED	-	0.90	0.60	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 25.30
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.24
AVERAGE FLOW DEPTH (FEET) = 1.16 TRAVEL TIME (MIN.) = 1.62
Tc (MIN.) = 15.79
SUBAREA AREA (ACRES) = 3.50 SUBAREA RUNOFF (CFS) = 0.70
EFFECTIVE AREA (ACRES) = 103.70 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 103.7 PEAK FLOW RATE (CFS) = 24.95
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.15 FLOW VELOCITY (FEET/SEC.) = 6.24
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.) = 15.79 **OF-8**
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.821
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.80	0.60	1.000	-
USER-DEFINED	-	4.20	0.60	1.000	-
USER-DEFINED	-	5.10	0.60	1.000	-
USER-DEFINED	-	7.00	0.60	1.000	-
USER-DEFINED	-	12.00	0.60	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 32.10 SUBAREA RUNOFF (CFS) = 6.39
EFFECTIVE AREA (ACRES) = 135.80 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 135.8 PEAK FLOW RATE (CFS) = 27.03

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 **OF-9**
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.735
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.60	1.000	-
USER-DEFINED	-	0.70	0.60	1.000	-
USER-DEFINED	-	2.30	0.60	1.000	-
USER-DEFINED	-	2.40	0.60	1.000	-
USER-DEFINED	-	2.50	0.60	1.000	-
USER-DEFINED	-	3.20	0.60	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 27.74
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.11
AVERAGE FLOW DEPTH (FEET) = 1.50 TRAVEL TIME (MIN.) = 3.59
Tc (MIN.) = 19.38
SUBAREA AREA (ACRES) = 11.60 SUBAREA RUNOFF (CFS) = 1.41
EFFECTIVE AREA (ACRES) = 147.40 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 147.4 PEAK FLOW RATE (CFS) = 27.03
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.48 FLOW VELOCITY (FEET/SEC.) = 4.09
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 926.00 = 3824.00 FEET.

FLOW PROCESS FROM NODE 926.00 TO NODE 926.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 19.38					
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.735					
SUBAREA LOSS RATE DATA (AMC II):					
DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	7.40	0.60	1.000	-
USER-DEFINED	-	12.40	0.60	1.000	-
USER-DEFINED	-	28.20	0.60	1.000	-
USER-DEFINED	-	31.40	0.60	1.000	-
USER-DEFINED	-	42.40	0.60	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 121.80 SUBAREA RUNOFF (CFS) = 14.81
EFFECTIVE AREA (ACRES) = 269.20 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 269.2 PEAK FLOW RATE (CFS) = 32.74

OF-9

FLOW PROCESS FROM NODE 926.00 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) = 440.00 DOWNSTREAM (FEET) = 426.00
FLOW LENGTH (FEET) = 1341.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.7 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 9.05
ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 32.74
PIPE TRAVEL TIME (MIN.) = 2.47 Tc (MIN.) = 21.85
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.) = 21.85
RAINFALL INTENSITY (INCH/HR) = 0.69
AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA (ACRES) = 269.20
TOTAL STREAM AREA (ACRES) = 269.20
PEAK FLOW RATE (CFS) AT CONFLUENCE = 32.74

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
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.281
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"	-	0.60	0.60	1.000	0	7.95

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 0.37
TOTAL AREA (ACRES) = 0.60 PEAK FLOW RATE (CFS) = 0.37

OF-10

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
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 1.117

OF-11

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	0.900	-
USER-DEFINED	-	0.40	0.60	0.100	-
USER-DEFINED	-	0.30	0.60	1.000	-
USER-DEFINED	-	4.30	0.60	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.927
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 1.67
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.86
AVERAGE FLOW DEPTH (FEET) = 0.34 TRAVEL TIME (MIN.) = 1.52
Tc (MIN.) = 9.47
SUBAREA AREA (ACRES) = 5.10 SUBAREA RUNOFF (CFS) = 2.57
EFFECTIVE AREA (ACRES) = 5.70 AREA-AVERAGED Fm (INCH/HR) = 0.56
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.94
TOTAL AREA (ACRES) = 5.7 PEAK FLOW RATE (CFS) = 2.85

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.41 FLOW VELOCITY (FEET/SEC.) = 5.52
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
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.73
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.85
PIPE TRAVEL TIME(MIN.) = 0.74 Tc(MIN.) = 10.21
LONGEST FLOWPATH FROM NODE 930.00 TO NODE 903.00 = 1027.00 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<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 10.21
RAINFALL INTENSITY(INCH/HR) = 1.05
AREA-AVERAGED Fm(INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.94
EFFECTIVE STREAM AREA(ACRES) = 5.70
TOTAL STREAM AREA(ACRES) = 5.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.85

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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	15.88	14.70	0.853	0.60(0.47)	0.79	42.5	910.00
1	10.45	19.84	0.724	0.60(0.47)	0.79	42.8	900.00
2	32.74	21.85	0.687	0.60(0.60)	1.00	269.2	920.00
3	2.85	10.21	1.051	0.60(0.56)	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	51.47	10.21	1.051	0.60(0.58)	0.96	161.1	930.00
2	50.32	14.70	0.853	0.60(0.58)	0.96	229.3	910.00
3	44.13	19.84	0.724	0.60(0.58)	0.97	292.9	900.00
4	42.37	21.85	0.687	0.60(0.58)	0.97	317.7	920.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 51.47 Tc(MIN.) = 10.21
EFFECTIVE AREA(ACRES) = 161.05 AREA-AVERAGED Fm(INCH/HR) = 0.58
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.96
TOTAL AREA(ACRES) = 317.7
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 = 81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 10.21
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.051 **F-3**
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.60	0.900	-
USER-DEFINED	-	2.10	0.60	0.900	-
USER-DEFINED	-	3.00	0.60	0.900	-
USER-DEFINED	-	5.90	0.60	0.100	-
USER-DEFINED	-	7.70	0.60	0.100	-
USER-DEFINED	-	13.60	0.60	0.100	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.237
SUBAREA AREA(ACRES) = 32.80 SUBAREA RUNOFF(CFS) = 26.83
EFFECTIVE AREA(ACRES) = 193.85 AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.84
TOTAL AREA(ACRES) = 350.5 PEAK FLOW RATE(CFS) = 95.75

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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 30.0 INCH PIPE IS 24.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.59
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 95.75
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 10.87
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.) = 10.87
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.022 **F-4**
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.80	0.60	0.100	-
USER-DEFINED	-	0.60	0.60	0.100	-
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	2.40	0.60	0.900	-
USER-DEFINED	-	2.20	0.60	0.900	-
USER-DEFINED	-	0.30	0.60	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA(ACRES) = 9.40 SUBAREA RUNOFF(CFS) = 5.97
EFFECTIVE AREA(ACRES) = 203.25 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.82
TOTAL AREA(ACRES) = 359.9 PEAK FLOW RATE(CFS) = 96.64

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*****
FLOW PROCESS FROM NODE    904.00 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) = 370.00 DOWNSTREAM(FEET) = 330.00
FLOW LENGTH(FEET) = 872.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.47
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 96.64
PIPE TRAVEL TIME(MIN.) = 0.71 Tc(MIN.) = 11.58
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 = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 11.58
RAINFALL INTENSITY(INCH/HR) = 0.99
AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 0.82
EFFECTIVE STREAM AREA(ACRES) = 203.25
TOTAL STREAM AREA(ACRES) = 359.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 96.64
*****
FLOW PROCESS FROM NODE    940.00 TO NODE    941.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
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
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.309
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" -      0.10   0.60   1.000   0   7.69
NATURAL FAIR COVER
"OPEN BRUSH"         -      1.10   0.60   1.000   0   7.69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.77
TOTAL AREA(ACRES) = 1.20 PEAK FLOW RATE(CFS) = 0.77
*****
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)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 675.00 DOWNSTREAM(FEET) = 405.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1008.00 CHANNEL SLOPE = 0.2679
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.056
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED       -      0.10   0.60   1.000   -
USER-DEFINED       -      0.80   0.60   1.000   -
USER-DEFINED       -      1.10   0.60   1.000   -
USER-DEFINED       -      1.50   0.60   1.000   -
USER-DEFINED       -      3.60   0.60   1.000   -
USER-DEFINED       -     10.20   0.60   1.000   -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.44
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.98
AVERAGE FLOW DEPTH(FEET) = 0.46 TRAVEL TIME(MIN.) = 2.41
Tc(MIN.) = 10.10
SUBAREA AREA(ACRES) = 17.30 SUBAREA RUNOFF(CFS) = 7.10
EFFECTIVE AREA(ACRES) = 18.50 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 18.5 PEAK FLOW RATE(CFS) = 7.59

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.56 FLOW VELOCITY(FEET/SEC.) = 8.02
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
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.03
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.59
PIPE TRAVEL TIME(MIN.) = 1.33 Tc(MIN.) = 11.43
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.) = 11.43
RAINFALL INTENSITY(INCH/HR) = 1.00

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AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 18.50
TOTAL STREAM AREA(ACRES) = 18.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.59

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**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.064
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"	-	0.40	0.60	1.000	0	9.96
NATURAL FAIR COVER						
"OPEN BRUSH"	-	1.00	0.60	1.000	0	9.96

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.58
TOTAL AREA(ACRES) = 1.40 PEAK FLOW RATE(CFS) = 0.58

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 **OF-16**
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.957
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.40	0.60	1.000	-
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	0.70	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.88
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.08
AVERAGE FLOW DEPTH(FEET) = 0.31 TRAVEL TIME(MIN.) = 2.38
Tc(MIN.) = 12.34
SUBAREA AREA(ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 0.58
EFFECTIVE AREA(ACRES) = 3.20 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 1.03

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 FLOW VELOCITY(FEET/SEC.) = 3.24
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 **OF-17**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.870
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	1.50	0.60	1.000	-
USER-DEFINED	-	1.70	0.60	1.000	-
USER-DEFINED	-	3.40	0.60	1.000	-
USER-DEFINED	-	7.20	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.81
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.80
AVERAGE FLOW DEPTH(FEET) = 0.37 TRAVEL TIME(MIN.) = 1.99
Tc(MIN.) = 14.33
SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 3.50
EFFECTIVE AREA(ACRES) = 17.60 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 17.6 PEAK FLOW RATE(CFS) = 4.27

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.43 FLOW VELOCITY(FEET/SEC.) = 7.63
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 **OF-18**
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.802
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	2.10	0.60	1.000	-

USER-DEFINED - 8.90 0.60 1.000 -
USER-DEFINED - 14.80 0.60 1.000 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 6.72
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.09
AVERAGE FLOW DEPTH (FEET) = 0.56 TRAVEL TIME (MIN.) = 2.24
Tc (MIN.) = 16.57
SUBAREA AREA (ACRES) = 26.60 SUBAREA RUNOFF (CFS) = 4.85
EFFECTIVE AREA (ACRES) = 44.20 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 44.2 PEAK FLOW RATE (CFS) = 8.05

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.61 FLOW VELOCITY (FEET/SEC.) = 7.32
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
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.741

OF-19

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.40	0.60	1.000	-
USER-DEFINED	-	0.40	0.60	1.000	-
USER-DEFINED	-	2.90	0.60	1.000	-
USER-DEFINED	-	5.20	0.60	1.000	-
USER-DEFINED	-	9.50	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 9.24
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.33
AVERAGE FLOW DEPTH (FEET) = 0.76 TRAVEL TIME (MIN.) = 2.55
Tc (MIN.) = 19.12
SUBAREA AREA (ACRES) = 18.50 SUBAREA RUNOFF (CFS) = 2.35
EFFECTIVE AREA (ACRES) = 62.70 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 62.7 PEAK FLOW RATE (CFS) = 8.05
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.72 FLOW VELOCITY (FEET/SEC.) = 5.15
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
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.694

OF-20

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.60	1.000	-
USER-DEFINED	-	0.50	0.60	1.000	-
USER-DEFINED	-	1.20	0.60	1.000	-
USER-DEFINED	-	3.60	0.60	1.000	-
USER-DEFINED	-	3.80	0.60	1.000	-
USER-DEFINED	-	6.10	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 8.70
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.55
AVERAGE FLOW DEPTH (FEET) = 0.80 TRAVEL TIME (MIN.) = 2.35
Tc (MIN.) = 21.47
SUBAREA AREA (ACRES) = 15.40 SUBAREA RUNOFF (CFS) = 1.30
EFFECTIVE AREA (ACRES) = 78.10 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 78.1 PEAK FLOW RATE (CFS) = 8.05
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.78 FLOW VELOCITY (FEET/SEC.) = 4.47
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.) = 21.47
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.694

OF-20

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	14.30	0.60	1.000	-
USER-DEFINED	-	21.60	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 35.90 SUBAREA RUNOFF (CFS) = 3.03
EFFECTIVE AREA (ACRES) = 114.00 AREA-AVERAGED Fm (INCH/HR) = 0.60
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 114.0 PEAK FLOW RATE (CFS) = 9.61

FLOW PROCESS FROM NODE 956.00 TO NODE 956.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 21.47
* 2 YEAR RAINFALL INTENSITY (INCH/HR) = 0.694
SUBAREA LOSS RATE DATA (AMC II):

OF-21

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.30	0.60	1.000	-
USER-DEFINED	-	0.30	0.60	1.000	-
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	2.30	0.60	1.000	-
USER-DEFINED	-	3.20	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 0.56
EFFECTIVE AREA(ACRES) = 120.70 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 120.7 PEAK FLOW RATE(CFS) = 10.18

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
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.72
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.18
PIPE TRAVEL TIME(MIN.) = 2.03 Tc(MIN.) = 23.50
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.) = 23.50
RAINFALL INTENSITY(INCH/HR) = 0.66
AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 120.70
TOTAL STREAM AREA(ACRES) = 120.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.18

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	96.64	11.58	0.990	0.60(0.49)	0.82	203.3	930.00
1	78.36	16.13	0.813	0.60(0.51)	0.86	271.5	910.00
1	54.94	21.39	0.695	0.60(0.53)	0.88	335.1	900.00
1	45.99	23.47	0.658	0.60(0.54)	0.89	359.9	920.00
2	7.59	11.43	0.997	0.60(0.60)	1.00	18.5	940.00
3	10.18	23.50	0.657	0.60(0.60)	1.00	120.7	950.00

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 (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	114.41	11.43	0.997	0.60(0.52)	0.87	277.8	940.00
2	114.28	11.58	0.990	0.60(0.52)	0.87	281.3	930.00
3	92.61	16.13	0.813	0.60(0.54)	0.90	372.8	910.00
4	66.94	21.39	0.695	0.60(0.55)	0.92	463.5	900.00
5	57.27	23.47	0.658	0.60(0.55)	0.92	498.9	920.00
6	57.05	23.50	0.657	0.60(0.55)	0.92	499.1	950.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 114.41 Tc(MIN.) = 11.43
EFFECTIVE AREA(ACRES) = 277.81 AREA-AVERAGED Fm(INCH/HR) = 0.52
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.87
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.) = 11.43
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.997
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	12.30	0.60	0.100	-
USER-DEFINED	-	26.80	0.60	0.100	-
USER-DEFINED	-	2.00	0.60	0.100	-
USER-DEFINED	-	2.70	0.60	0.900	-
USER-DEFINED	-	0.80	0.60	0.900	-
USER-DEFINED	-	2.10	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA(ACRES) = 46.70 SUBAREA RUNOFF(CFS) = 36.97
EFFECTIVE AREA(ACRES) = 324.51 AREA-AVERAGED Fm(INCH/HR) = 0.46
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.77
TOTAL AREA(ACRES) = 545.8 PEAK FLOW RATE(CFS) = 155.51

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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.) = 11.43
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.997
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	8.00	0.60	0.100	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 6.75
EFFECTIVE AREA(ACRES) = 332.51 AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.76

F-5

TOTAL AREA (ACRES) = 553.8 PEAK FLOW RATE (CFS) = 162.26

=====
END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 553.8 TC (MIN.) = 11.43
EFFECTIVE AREA (ACRES) = 332.51 AREA-AVERAGED Fm (INCH/HR) = 0.45
AREA-AVERAGED Fp (INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.758
PEAK FLOW RATE (CFS) = 162.26

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	162.26	11.43	0.997	0.60 (0.45)	0.76	332.5	940.00
2	161.72	11.58	0.990	0.60 (0.46)	0.76	336.0	930.00
3	127.13	16.13	0.813	0.60 (0.48)	0.80	427.5	910.00
4	89.51	21.39	0.695	0.60 (0.50)	0.84	518.2	900.00
5	73.92	23.47	0.658	0.60 (0.51)	0.85	553.6	920.00
6	73.65	23.50	0.657	0.60 (0.51)	0.85	553.8	950.00

=====
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:

Michael Baker International
5 Hutton Centre Drive, Suite 500
Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-4 SUBAREA F *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 5-YR EV AUG 2018 CCHI *

FILE NAME: PA4F05EV.DAT
TIME/DATE OF STUDY: 15:51 08/07/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 5.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 2.180
- 2) 10.00; 1.510
- 3) 15.00; 1.200
- 4) 20.00; 1.020
- 5) 25.00; 0.900
- 6) 30.00; 0.830
- 7) 40.00; 0.690
- 8) 50.00; 0.610
- 9) 60.00; 0.550
- 10) 90.00; 0.440
- 11) 120.00; 0.370
- 12) 180.00; 0.310
- 13) 360.00; 0.210
- 14) 1200.00; 0.090

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-	CROWN TO	STREET-CROSSFALL:		CURB HEIGHT (FT)	GUTTER-GEOMETRIES:			MANNING FACTOR (n)
	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / SIDE/ WAY		WIDTH (FT)	LIP (FT)	HIKE (FT)	
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 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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.277

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"	-	0.70	0.50	1.000	0	13.76
NATURAL FAIR COVER "OPEN BRUSH"	-	0.50	0.50	1.000	0	13.76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.84
TOTAL AREA(ACRES) = 1.20 PEAK FLOW RATE(CFS) = 0.84

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 2.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.67
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.84
PIPE TRAVEL TIME(MIN.) = 3.89 Tc(MIN.) = 17.65
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.) = 17.65
RAINFALL INTENSITY(INCH/HR) = 1.10
AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.50

AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA (ACRES) = 1.20
TOTAL STREAM AREA (ACRES) = 1.20
PEAK FLOW RATE (CFS) AT CONFLUENCE = 0.84

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.759

OF-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"	-	0.10	0.50	1.000	0	8.14
NATURAL FAIR COVER						
"CHAPARRAL, BROADLEAF"	-	0.50	0.50	1.000	0	8.14
NATURAL FAIR COVER						
"OPEN BRUSH"	-	1.00	0.50	1.000	0	8.14

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF (CFS) = 1.81

TOTAL AREA (ACRES) = 1.60 PEAK FLOW RATE (CFS) = 1.81

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

OF-2

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.589

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	1.00	0.50	1.000	-
USER-DEFINED	-	0.60	0.50	1.000	-
USER-DEFINED	-	2.30	0.50	1.000	-
USER-DEFINED	-	1.00	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 4.22

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.02

AVERAGE FLOW DEPTH (FEET) = 0.48 TRAVEL TIME (MIN.) = 1.27

Tc (MIN.) = 9.41

SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 4.80

EFFECTIVE AREA (ACRES) = 6.50 AREA-AVERAGED Fm (INCH/HR) = 0.50

AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 6.5 PEAK FLOW RATE (CFS) = 6.37

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 0.56 FLOW VELOCITY (FEET/SEC.) = 6.73

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

OF-3

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.441

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	4.60	0.50	1.000	-
USER-DEFINED	-	4.00	0.50	1.000	-
USER-DEFINED	-	0.60	0.50	1.000	-
USER-DEFINED	-	2.70	0.50	1.000	-
USER-DEFINED	-	5.10	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 13.63

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.07

AVERAGE FLOW DEPTH (FEET) = 0.86 TRAVEL TIME (MIN.) = 1.70

Tc (MIN.) = 11.11

SUBAREA AREA (ACRES) = 17.10 SUBAREA RUNOFF (CFS) = 14.49

EFFECTIVE AREA (ACRES) = 23.60 AREA-AVERAGED Fm (INCH/HR) = 0.50

AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 23.6 PEAK FLOW RATE (CFS) = 19.99

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 1.00 FLOW VELOCITY (FEET/SEC.) = 6.71

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 24.0 INCH PIPE IS 16.8 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 8.51

ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 19.99

PIPE TRAVEL TIME (MIN.) = 1.74 Tc (MIN.) = 12.85

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.) = 12.85
RAINFALL INTENSITY(INCH/HR) = 1.33
AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.50
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 23.60
TOTAL STREAM AREA(ACRES) = 23.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.99

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	0.84	17.65	1.105	0.50(0.50)	1.00	1.2	900.00
2	19.99	12.85	1.333	0.50(0.50)	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	20.83	12.85	1.333	0.50(0.50)	1.00	24.5	910.00
2	15.34	17.65	1.105	0.50(0.50)	1.00	24.8	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 20.83 Tc(MIN.) = 12.85
EFFECTIVE AREA(ACRES) = 24.47 AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.50 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.) = 12.85
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.333

F-2

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.20 0.50 1.000 -
USER-DEFINED - 5.50 0.50 0.100 -
USER-DEFINED - 0.20 0.50 1.000 -
USER-DEFINED - 0.10 0.50 0.900 -
USER-DEFINED - 0.10 0.50 1.000 -
USER-DEFINED - 1.00 0.50 0.100 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.175
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 7.96
EFFECTIVE AREA(ACRES) = 31.57 AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.81

TOTAL AREA(ACRES) = 31.9 PEAK FLOW RATE(CFS) = 26.31

FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 12.85
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.333

F-2

SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.20 0.50 1.000 -
USER-DEFINED - 0.10 0.50 0.900 -
USER-DEFINED - 3.20 0.50 1.000 -
USER-DEFINED - 3.40 0.50 0.100 -
USER-DEFINED - 3.30 0.50 1.000 -
USER-DEFINED - 0.70 0.50 0.900 -
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.712
SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 9.59
EFFECTIVE AREA(ACRES) = 42.47 AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.79
TOTAL AREA(ACRES) = 42.8 PEAK FLOW RATE(CFS) = 35.90

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 24.0 INCH PIPE IS 15.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.82
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 35.90
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 13.50
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.) = 13.50
RAINFALL INTENSITY(INCH/HR) = 1.29
AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.79
EFFECTIVE STREAM AREA(ACRES) = 42.47
TOTAL STREAM AREA(ACRES) = 42.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.90

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.813
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
"OPEN BRUSH" - 0.20 0.50 1.000 0 7.74
NATURAL FAIR COVER
"OPEN BRUSH" - 0.70 0.50 1.000 0 7.74
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 1.06
TOTAL AREA (ACRES) = 0.90 PEAK FLOW RATE (CFS) = 1.06

OF-4

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.626

OF-5

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.20 0.50 1.000 -
USER-DEFINED - 1.00 0.50 1.000 -
USER-DEFINED - 1.40 0.50 1.000 -
USER-DEFINED - 4.40 0.50 1.000 -
USER-DEFINED - 6.70 0.50 1.000 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 8.04
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.08
AVERAGE FLOW DEPTH (FEET) = 0.62 TRAVEL TIME (MIN.) = 1.40
Tc (MIN.) = 9.13
SUBAREA AREA (ACRES) = 13.70 SUBAREA RUNOFF (CFS) = 13.88
EFFECTIVE AREA (ACRES) = 14.60 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 14.6 PEAK FLOW RATE (CFS) = 14.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.77 FLOW VELOCITY (FEET/SEC.) = 8.24
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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.466

OF-6

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.70 0.50 1.000 -
USER-DEFINED - 1.40 0.50 1.000 -
USER-DEFINED - 5.40 0.50 1.000 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 18.05
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.37
AVERAGE FLOW DEPTH (FEET) = 0.97 TRAVEL TIME (MIN.) = 1.58
Tc (MIN.) = 10.71
SUBAREA AREA (ACRES) = 7.50 SUBAREA RUNOFF (CFS) = 6.52
EFFECTIVE AREA (ACRES) = 22.10 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 22.1 PEAK FLOW RATE (CFS) = 19.20

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.99 FLOW VELOCITY (FEET/SEC.) = 6.47
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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.327

OF-7

SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.60 0.50 1.000 -
USER-DEFINED - 0.80 0.50 1.000 -
USER-DEFINED - 0.80 0.50 1.000 -
USER-DEFINED - 1.10 0.50 1.000 -
USER-DEFINED - 5.20 0.50 1.000 -
USER-DEFINED - 6.30 0.50 1.000 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 24.71
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.32
AVERAGE FLOW DEPTH (FEET) = 1.14 TRAVEL TIME (MIN.) = 2.24
Tc (MIN.) = 12.95
SUBAREA AREA (ACRES) = 14.80 SUBAREA RUNOFF (CFS) = 11.01
EFFECTIVE AREA (ACRES) = 36.90 AREA-AVERAGED Fm (INCH/HR) = 0.50

AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 36.9 PEAK FLOW RATE (CFS) = 27.46

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.19 FLOW VELOCITY (FEET/SEC.) = 6.43
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.) = 12.95 **OF-7**
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.327
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	9.70	0.50	1.000	-
USER-DEFINED	-	17.00	0.50	1.000	-
USER-DEFINED	-	36.60	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 63.30 SUBAREA RUNOFF (CFS) = 47.10
EFFECTIVE AREA (ACRES) = 100.20 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 100.2 PEAK FLOW RATE (CFS) = 74.55

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 **OF-8**
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.251
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.30	0.50	1.000	-
USER-DEFINED	-	0.60	0.50	1.000	-
USER-DEFINED	-	0.70	0.50	1.000	-
USER-DEFINED	-	0.90	0.50	1.000	-
USER-DEFINED	-	0.90	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 75.74
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 8.23
AVERAGE FLOW DEPTH (FEET) = 1.75 TRAVEL TIME (MIN.) = 1.23
Tc (MIN.) = 14.18
SUBAREA AREA (ACRES) = 3.50 SUBAREA RUNOFF (CFS) = 2.36
EFFECTIVE AREA (ACRES) = 103.70 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 103.7 PEAK FLOW RATE (CFS) = 74.55
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.74 FLOW VELOCITY (FEET/SEC.) = 8.19
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.) = 14.18 **OF-8**
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.251
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.80	0.50	1.000	-
USER-DEFINED	-	4.20	0.50	1.000	-
USER-DEFINED	-	5.10	0.50	1.000	-
USER-DEFINED	-	7.00	0.50	1.000	-
USER-DEFINED	-	12.00	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 32.10 SUBAREA RUNOFF (CFS) = 21.68
EFFECTIVE AREA (ACRES) = 135.80 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 135.8 PEAK FLOW RATE (CFS) = 91.72

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 **OF-9**
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.134
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.50	1.000	-
USER-DEFINED	-	0.70	0.50	1.000	-
USER-DEFINED	-	2.30	0.50	1.000	-
USER-DEFINED	-	2.40	0.50	1.000	-
USER-DEFINED	-	2.50	0.50	1.000	-
USER-DEFINED	-	3.20	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 95.04
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.58
AVERAGE FLOW DEPTH (FEET) = 2.38 TRAVEL TIME (MIN.) = 2.64
Tc (MIN.) = 16.82
SUBAREA AREA (ACRES) = 11.60 SUBAREA RUNOFF (CFS) = 6.62
EFFECTIVE AREA (ACRES) = 147.40 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 147.4 PEAK FLOW RATE (CFS) = 91.72
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 2.35 FLOW VELOCITY (FEET/SEC.) = 5.55
LONGEST FLOWPATH FROM NODE 920.00 TO NODE 926.00 = 3824.00 FEET.

FLOW PROCESS FROM NODE 926.00 TO NODE 926.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 16.82
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.134 **OF-9**
SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	7.40	0.50	1.000	-
USER-DEFINED	-	12.40	0.50	1.000	-
USER-DEFINED	-	28.20	0.50	1.000	-
USER-DEFINED	-	31.40	0.50	1.000	-
USER-DEFINED	-	42.40	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA (ACRES) = 121.80 SUBAREA RUNOFF (CFS) = 69.51
EFFECTIVE AREA (ACRES) = 269.20 AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 269.2 PEAK FLOW RATE (CFS) = 153.64

FLOW PROCESS FROM NODE 926.00 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) = 440.00 DOWNSTREAM (FEET) = 426.00
FLOW LENGTH (FEET) = 1341.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 39.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 13.12
ESTIMATED PIPE DIAMETER (INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 153.64
PIPE TRAVEL TIME (MIN.) = 1.70 Tc (MIN.) = 18.53
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.) = 18.53
RAINFALL INTENSITY (INCH/HR) = 1.07
AREA-AVERAGED Fm (INCH/HR) = 0.50
AREA-AVERAGED Fp (INCH/HR) = 0.50
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA (ACRES) = 269.20
TOTAL STREAM AREA (ACRES) = 269.20
PEAK FLOW RATE (CFS) AT CONFLUENCE = 153.64

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 **OF-10**
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 7.954
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.784
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"	-	0.60	0.50	1.000	0	7.95

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 0.69
TOTAL AREA (ACRES) = 0.60 PEAK FLOW RATE (CFS) = 0.69

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 **OF-11**
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.612

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	0.900	-
USER-DEFINED	-	0.40	0.50	0.100	-
USER-DEFINED	-	0.30	0.50	1.000	-
USER-DEFINED	-	4.30	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.927
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.34
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.76
AVERAGE FLOW DEPTH (FEET) = 0.44 TRAVEL TIME (MIN.) = 1.28
Tc (MIN.) = 9.24
SUBAREA AREA (ACRES) = 5.10 SUBAREA RUNOFF (CFS) = 5.27
EFFECTIVE AREA (ACRES) = 5.70 AREA-AVERAGED Fm (INCH/HR) = 0.47
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.94
TOTAL AREA (ACRES) = 5.7 PEAK FLOW RATE (CFS) = 5.87

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.54 FLOW VELOCITY (FEET/SEC.) = 6.60
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
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.97
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.87
PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 9.84
LONGEST FLOWPATH FROM NODE 930.00 TO NODE 903.00 = 1027.00 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<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 9.84
RAINFALL INTENSITY(INCH/HR) = 1.53
AREA-AVERAGED Fm(INCH/HR) = 0.47
AREA-AVERAGED Fp(INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.94
EFFECTIVE STREAM AREA(ACRES) = 5.70
TOTAL STREAM AREA(ACRES) = 5.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.87

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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	35.90	13.50	1.293	0.50(0.39)	0.79	42.5	910.00
1	27.33	18.35	1.079	0.50(0.40)	0.79	42.8	900.00
2	153.64	18.53	1.073	0.50(0.50)	1.00	269.2	920.00
3	5.87	9.84	1.531	0.50(0.47)	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	184.59	9.84	1.531	0.50(0.48)	0.96	179.7	930.00
2	194.09	13.50	1.293	0.50(0.48)	0.96	244.3	910.00
3	184.34	18.35	1.079	0.50(0.49)	0.97	315.1	900.00
4	184.05	18.53	1.073	0.50(0.49)	0.97	317.7	920.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 194.09 Tc(MIN.) = 13.50
EFFECTIVE AREA(ACRES) = 244.28 AREA-AVERAGED Fm(INCH/HR) = 0.48
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.96
TOTAL AREA(ACRES) = 317.7
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 = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
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MAINLINE Tc(MIN.) = 13.50 F-3
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.293
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.50	0.50	0.900	-
USER-DEFINED	-	2.10	0.50	0.900	-
USER-DEFINED	-	3.00	0.50	0.900	-
USER-DEFINED	-	5.90	0.50	0.100	-
USER-DEFINED	-	7.70	0.50	0.100	-
USER-DEFINED	-	13.60	0.50	0.100	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.237
SUBAREA AREA(ACRES) = 32.80 SUBAREA RUNOFF(CFS) = 34.68
EFFECTIVE AREA(ACRES) = 277.08 AREA-AVERAGED Fm(INCH/HR) = 0.44
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.88
TOTAL AREA(ACRES) = 350.5 PEAK FLOW RATE(CFS) = 213.23

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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 42.0 INCH PIPE IS 31.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 28.04
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 213.23
PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 14.03
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.) = 14.03 F-4
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.260
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	3.80	0.50	0.100	-
USER-DEFINED	-	0.60	0.50	0.100	-
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	2.40	0.50	0.900	-
USER-DEFINED	-	2.20	0.50	0.900	-
USER-DEFINED	-	0.30	0.50	0.900	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA(ACRES) = 9.40 SUBAREA RUNOFF(CFS) = 8.43
EFFECTIVE AREA(ACRES) = 286.48 AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.86
TOTAL AREA(ACRES) = 359.9 PEAK FLOW RATE(CFS) = 213.43

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*****
FLOW PROCESS FROM NODE    904.00 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) = 370.00 DOWNSTREAM(FEET) = 330.00
FLOW LENGTH( FEET) = 872.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 32.4 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 25.05
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 213.43
PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 14.61
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 = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 14.61
RAINFALL INTENSITY(INCH/HR) = 1.22
AREA-AVERAGED Fm(INCH/HR) = 0.43
AREA-AVERAGED Fp(INCH/HR) = 0.50
AREA-AVERAGED Ap = 0.86
EFFECTIVE STREAM AREA(ACRES) = 286.48
TOTAL STREAM AREA(ACRES) = 359.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 213.43

*****
FLOW PROCESS FROM NODE    940.00 TO NODE    941.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.819
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" - 0.10 0.50 1.000 0 7.69
NATURAL FAIR COVER
"OPEN BRUSH" - 1.10 0.50 1.000 0 7.69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.42
TOTAL AREA(ACRES) = 1.20 PEAK FLOW RATE(CFS) = 1.42

*****
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)<<<<
=====
ELEVATION DATA: UPSTREAM( FEET) = 675.00 DOWNSTREAM( FEET) = 405.00
CHANNEL LENGTH THRU SUBAREA( FEET) = 1008.00 CHANNEL SLOPE = 0.2679
CHANNEL BASE( FEET) = 0.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.040 MAXIMUM DEPTH( FEET) = 30.00
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.552
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
USER-DEFINED - 0.10 0.50 1.000 -
USER-DEFINED - 0.80 0.50 1.000 -
USER-DEFINED - 1.10 0.50 1.000 -
USER-DEFINED - 1.50 0.50 1.000 -
USER-DEFINED - 3.60 0.50 1.000 -
USER-DEFINED - 10.20 0.50 1.000 -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.73
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY( FEET/SEC.) = 8.41
AVERAGE FLOW DEPTH( FEET) = 0.62 TRAVEL TIME(MIN.) = 2.00
Tc(MIN.) = 9.69
SUBAREA AREA(ACRES) = 17.30 SUBAREA RUNOFF(CFS) = 16.37
EFFECTIVE AREA(ACRES) = 18.50 AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 18.5 PEAK FLOW RATE(CFS) = 17.51

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH( FEET) = 0.77 FLOW VELOCITY( FEET/SEC.) = 9.90
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 18.0 INCH PIPE IS 10.6 INCHES
PIPE-FLOW VELOCITY( FEET/SEC.) = 16.14
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.51
PIPE TRAVEL TIME(MIN.) = 1.08 Tc(MIN.) = 10.76
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.) = 10.76
RAINFALL INTENSITY(INCH/HR) = 1.46
AREA-AVERAGED Fm(INCH/HR) = 0.50

```

OF-14

AREA-AVERAGED Fp (INCH/HR) = 0.50
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA (ACRES) = 18.50
 TOTAL STREAM AREA (ACRES) = 18.50
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 17.51

 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
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.515

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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 "OPEN BRUSH"	-	0.40	0.50	1.000	0	9.96
NATURAL FAIR COVER "OPEN BRUSH"	-	1.00	0.50	1.000	0	9.96

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF (CFS) = 1.28
 TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 1.28

 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

OF-16

MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.394
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.40	0.50	1.000	-
USER-DEFINED	-	0.60	0.50	1.000	-
USER-DEFINED	-	0.70	0.50	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 2.00
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.85
 AVERAGE FLOW DEPTH (FEET) = 0.42 TRAVEL TIME (MIN.) = 1.90
 Tc (MIN.) = 11.87
 SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 1.45
 EFFECTIVE AREA (ACRES) = 3.20 AREA-AVERAGED Fm (INCH/HR) = 0.50
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 3.2 PEAK FLOW RATE (CFS) = 2.57

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.46 FLOW VELOCITY (FEET/SEC.) = 4.05
 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
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.298

OF-17

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.60	0.50	1.000	-
USER-DEFINED	-	1.50	0.50	1.000	-
USER-DEFINED	-	1.70	0.50	1.000	-
USER-DEFINED	-	3.40	0.50	1.000	-
USER-DEFINED	-	7.20	0.50	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 7.76
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 8.72
 AVERAGE FLOW DEPTH (FEET) = 0.54 TRAVEL TIME (MIN.) = 1.55
 Tc (MIN.) = 13.42
 SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 10.34
 EFFECTIVE AREA (ACRES) = 17.60 AREA-AVERAGED Fm (INCH/HR) = 0.50
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 17.6 PEAK FLOW RATE (CFS) = 12.64

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.65 FLOW VELOCITY (FEET/SEC.) = 9.87
 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
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.196

OF-18

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.60	0.50	1.000	-
USER-DEFINED	-	2.10	0.50	1.000	-
USER-DEFINED	-	8.90	0.50	1.000	-

USER-DEFINED - 14.80 0.50 1.000 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 20.98
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 9.35
 AVERAGE FLOW DEPTH (FEET) = 0.86 TRAVEL TIME (MIN.) = 1.70
 Tc (MIN.) = 15.12
 SUBAREA AREA (ACRES) = 26.60 SUBAREA RUNOFF (CFS) = 16.65
 EFFECTIVE AREA (ACRES) = 44.20 AREA-AVERAGED Fm (INCH/HR) = 0.50
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 44.2 PEAK FLOW RATE (CFS) = 27.67

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 0.96 FLOW VELOCITY (FEET/SEC.) = 10.04
 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
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.129

OF-19

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.50	1.000	-
USER-DEFINED	-	0.40	0.50	1.000	-
USER-DEFINED	-	0.40	0.50	1.000	-
USER-DEFINED	-	2.90	0.50	1.000	-
USER-DEFINED	-	5.20	0.50	1.000	-
USER-DEFINED	-	9.50	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 32.90
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.30
 AVERAGE FLOW DEPTH (FEET) = 1.23 TRAVEL TIME (MIN.) = 1.86
 Tc (MIN.) = 16.98
 SUBAREA AREA (ACRES) = 18.50 SUBAREA RUNOFF (CFS) = 10.47
 EFFECTIVE AREA (ACRES) = 62.70 AREA-AVERAGED Fm (INCH/HR) = 0.50
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 62.7 PEAK FLOW RATE (CFS) = 35.48

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 1.26 FLOW VELOCITY (FEET/SEC.) = 7.43
 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
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.071

OF-20

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.20	0.50	1.000	-
USER-DEFINED	-	0.50	0.50	1.000	-
USER-DEFINED	-	1.20	0.50	1.000	-
USER-DEFINED	-	3.60	0.50	1.000	-
USER-DEFINED	-	3.80	0.50	1.000	-
USER-DEFINED	-	6.10	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 39.43
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.62
 AVERAGE FLOW DEPTH (FEET) = 1.41 TRAVEL TIME (MIN.) = 1.62
 Tc (MIN.) = 18.59
 SUBAREA AREA (ACRES) = 15.40 SUBAREA RUNOFF (CFS) = 7.91
 EFFECTIVE AREA (ACRES) = 78.10 AREA-AVERAGED Fm (INCH/HR) = 0.50
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 78.1 PEAK FLOW RATE (CFS) = 40.09

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 1.42 FLOW VELOCITY (FEET/SEC.) = 6.66
 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.) = 18.59
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.071

OF-20

SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	14.30	0.50	1.000	-
USER-DEFINED	-	21.60	0.50	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA (ACRES) = 35.90 SUBAREA RUNOFF (CFS) = 18.43
 EFFECTIVE AREA (ACRES) = 114.00 AREA-AVERAGED Fm (INCH/HR) = 0.50
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 114.0 PEAK FLOW RATE (CFS) = 58.53

 FLOW PROCESS FROM NODE 956.00 TO NODE 956.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 18.59
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.071
 SUBAREA LOSS RATE DATA (AMC II):

OF-21

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.30	0.50	1.000	-

USER-DEFINED - 0.30 0.50 1.000 -
 USER-DEFINED - 0.60 0.50 1.000 -
 USER-DEFINED - 2.30 0.50 1.000 -
 USER-DEFINED - 3.20 0.50 1.000 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 3.44
 EFFECTIVE AREA(ACRES) = 120.70 AREA-AVERAGED Fm(INCH/HR) = 0.50
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 120.7 PEAK FLOW RATE(CFS) = 61.96

 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 30.0 INCH PIPE IS 21.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.55
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 61.96
 PIPE TRAVEL TIME(MIN.) = 1.31 Tc(MIN.) = 19.91
 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.) = 19.91
 RAINFALL INTENSITY(INCH/HR) = 1.02
 AREA-AVERAGED Fm(INCH/HR) = 0.50
 AREA-AVERAGED Fp(INCH/HR) = 0.50
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA(ACRES) = 120.70
 TOTAL STREAM AREA(ACRES) = 120.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 61.96

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	213.39	10.96	1.451	0.50(0.42)	0.84	221.9	930.00
1	213.43	14.61	1.224	0.50(0.43)	0.86	286.5	910.00
1	197.51	19.49	1.038	0.50(0.45)	0.89	357.3	900.00
1	196.73	19.67	1.032	0.50(0.45)	0.89	359.9	920.00
2	17.51	10.76	1.463	0.50(0.50)	1.00	18.5	940.00
3	61.96	19.91	1.023	0.50(0.50)	1.00	120.7	950.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM	Q	Tc	Intensity	Fp(Fm)	Ap	Ae	HEADWATER
--------	---	----	-----------	--------	----	----	-----------

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)	(ACRES)	NODE
1	291.21	10.76	1.463	0.50(0.44)	0.88	301.7 940.00
2	292.65	10.96	1.451	0.50(0.44)	0.88	306.8 930.00
3	288.56	14.61	1.224	0.50(0.45)	0.90	393.6 910.00
4	269.27	19.49	1.038	0.50(0.46)	0.92	494.0 900.00
5	268.37	19.67	1.032	0.50(0.46)	0.92	497.7 920.00
6	265.33	19.91	1.023	0.50(0.46)	0.92	499.1 950.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 292.65 Tc(MIN.) = 10.96
 EFFECTIVE AREA(ACRES) = 306.83 AREA-AVERAGED Fm(INCH/HR) = 0.44
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.88
 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.) = 10.96
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.451 **F-5**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 12.30 0.50 0.100 -
 USER-DEFINED - 26.80 0.50 0.100 -
 USER-DEFINED - 2.00 0.50 0.100 -
 USER-DEFINED - 2.70 0.50 0.900 -
 USER-DEFINED - 0.80 0.50 0.900 -
 USER-DEFINED - 2.10 0.50 0.900 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.196
 SUBAREA AREA(ACRES) = 46.70 SUBAREA RUNOFF(CFS) = 56.85
 EFFECTIVE AREA(ACRES) = 353.53 AREA-AVERAGED Fm(INCH/HR) = 0.40
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.79
 TOTAL AREA(ACRES) = 545.8 PEAK FLOW RATE(CFS) = 335.72

 FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 10.96
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.451 **F-5**
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED - 8.00 0.50 0.100 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 10.08
 EFFECTIVE AREA(ACRES) = 361.53 AREA-AVERAGED Fm(INCH/HR) = 0.39
 AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.78
 TOTAL AREA(ACRES) = 553.8 PEAK FLOW RATE(CFS) = 345.80

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 553.8 TC(MIN.) = 10.96

EFFECTIVE AREA(ACRES) = 361.53 AREA-AVERAGED Fm(INCH/HR)= 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.775
PEAK FLOW RATE(CFS) = 345.80

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	345.01	10.76	1.463	0.50(0.39)	0.77	356.4	940.00
2	345.80	10.96	1.451	0.50(0.39)	0.78	361.5	930.00
3	329.72	14.61	1.224	0.50(0.41)	0.81	448.3	910.00
4	303.40	19.49	1.038	0.50(0.42)	0.85	548.7	900.00
5	301.98	19.67	1.032	0.50(0.42)	0.85	552.4	920.00
6	298.39	19.91	1.023	0.50(0.42)	0.85	553.8	950.00

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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:

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Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-4 SUBAREA F *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 10-YR EV AUG 2018 CCHIU *

FILE NAME: PA4F10EV.DAT
TIME/DATE OF STUDY: 15:20 08/06/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 5.00
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 (FT)	LIP HEIGHT (FT)	HIKE HEIGHT (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 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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.803
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"	B	0.70	0.30	1.000	63	13.76
NATURAL FAIR COVER "OPEN BRUSH"	B	0.50	0.30	1.000	66	13.76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.62
TOTAL AREA(ACRES) = 1.20 PEAK FLOW RATE(CFS) = 1.62

F-1

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 4.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.65
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.62
PIPE TRAVEL TIME(MIN.) = 3.22 Tc(MIN.) = 16.98
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<<<<<

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TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 16.98
RAINFALL INTENSITY(INCH/HR) = 1.60
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 1.20
TOTAL STREAM AREA(ACRES) = 1.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.62

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
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.422
 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"	B	0.10	0.30	1.000	63	8.14
NATURAL FAIR COVER						
"CHAPARRAL,BROADLEAF"	B	0.50	0.30	1.000	63	8.14
NATURAL FAIR COVER						
"OPEN BRUSH"	B	1.00	0.30	1.000	66	8.14

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 3.06
 TOTAL AREA(ACRES) = 1.60 PEAK FLOW RATE(CFS) = 3.06

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
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.257

OF-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					
"CHAPARRAL,BROADLEAF"	B	1.00	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	2.30	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.00	0.30	1.000	66

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.37
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.01
 AVERAGE FLOW DEPTH(FEET) = 0.59 TRAVEL TIME(MIN.) = 1.09
 Tc(MIN.) = 9.23
 SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 8.63
 EFFECTIVE AREA(ACRES) = 6.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 6.5 PEAK FLOW RATE(CFS) = 11.45

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.70 FLOW VELOCITY(FEET/SEC.) = 7.81
 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
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.079

OF-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"	B	0.10	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	4.60	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	4.00	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.60	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	2.70	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	5.10	0.30	1.000	66

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 25.15
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.11
 AVERAGE FLOW DEPTH(FEET) = 1.09 TRAVEL TIME(MIN.) = 1.45
 Tc(MIN.) = 10.68
 SUBAREA AREA(ACRES) = 17.10 SUBAREA RUNOFF(CFS) = 27.38
 EFFECTIVE AREA(ACRES) = 23.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 23.6 PEAK FLOW RATE(CFS) = 37.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.26 FLOW VELOCITY(FEET/SEC.) = 7.89
 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 30.0 INCH PIPE IS 21.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.93
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 37.79
 PIPE TRAVEL TIME(MIN.) = 1.49 Tc(MIN.) = 12.17
 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.) = 12.17
RAINFALL INTENSITY (INCH/HR) = 1.93
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 23.60
TOTAL STREAM AREA(ACRES) = 23.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 37.79

** 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) = 39.25 Tc(MIN.) = 12.17
EFFECTIVE AREA(ACRES) = 24.46 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 12.17
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.932

F-2

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include CHAPARRAL, BROADLEAF, COMMERCIAL, NATURAL FAIR COVER, OPEN BRUSH, RESIDENTIAL, and DWELLING/ACRE.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.175
SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 12.01
EFFECTIVE AREA(ACRES) = 31.56 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.81
TOTAL AREA(ACRES) = 31.9 PEAK FLOW RATE(CFS) = 47.93

FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 12.17
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.932

F-2

Table with 6 columns: DEVELOPMENT TYPE/LAND USE, SCS SOIL GROUP, AREA (ACRES), Fp (INCH/HR), Ap (DECIMAL), SCS CN. Rows include NATURAL FAIR COVER, OPEN BRUSH, RESIDENTIAL, and DWELLING/ACRE.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.712
SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 16.86
EFFECTIVE AREA(ACRES) = 42.46 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.79
TOTAL AREA(ACRES) = 42.8 PEAK FLOW RATE(CFS) = 64.79

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 27.0 INCH PIPE IS 21.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.92
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 64.79
PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 12.75
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.) = 12.75
RAINFALL INTENSITY (INCH/HR) = 1.88
AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.79
EFFECTIVE STREAM AREA(ACRES) = 42.46
TOTAL STREAM AREA(ACRES) = 42.80

PEAK FLOW RATE(CFS) AT CONFLUENCE = 64.79

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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.492

OF-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
"OPEN BRUSH" B 0.20 0.30 1.000 66 7.74
NATURAL FAIR COVER
"OPEN BRUSH" B 0.70 0.30 1.000 66 7.74
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.78
TOTAL AREA(ACRES) = 0.90 PEAK FLOW RATE(CFS) = 1.78

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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.297

OF-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
"WOODLAND,GRASS" B 0.20 0.30 1.000 65
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 1.00 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 1.40 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 4.40 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 6.70 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.10
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.18
AVERAGE FLOW DEPTH(FEET) = 0.76 TRAVEL TIME(MIN.) = 1.21
Tc(MIN.) = 8.95
SUBAREA AREA(ACRES) = 13.70 SUBAREA RUNOFF(CFS) = 24.62
EFFECTIVE AREA(ACRES) = 14.60 AREA-AVERAGED Fm(INCH/HR) = 0.30

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 26.24

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.96 FLOW VELOCITY(FEET/SEC.) = 9.52
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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.121

OF-6

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 0.70 0.30 1.000 63
NATURAL FAIR COVER
"WOODLAND,GRASS" B 1.40 0.30 1.000 65
NATURAL FAIR COVER
"OPEN BRUSH" B 5.40 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 32.38
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.37
AVERAGE FLOW DEPTH(FEET) = 1.21 TRAVEL TIME(MIN.) = 1.37
Tc(MIN.) = 10.31
SUBAREA AREA(ACRES) = 7.50 SUBAREA RUNOFF(CFS) = 12.29
EFFECTIVE AREA(ACRES) = 22.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 22.1 PEAK FLOW RATE(CFS) = 36.21

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.26 FLOW VELOCITY(FEET/SEC.) = 7.58
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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.928

OF-7

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" B 0.60 0.30 1.000 65

NATURAL FAIR COVER
 "WOODLAND,GRASS" B 0.80 0.30 1.000 65
 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" B 5.20 0.30 1.000 65
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 6.30 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 47.06
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.42
 AVERAGE FLOW DEPTH(FEET) = 1.45 TRAVEL TIME(MIN.) = 1.91
 Tc(MIN.) = 12.22
 SUBAREA AREA(ACRES) = 14.80 SUBAREA RUNOFF(CFS) = 21.68
 EFFECTIVE AREA(ACRES) = 36.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 36.9 PEAK FLOW RATE(CFS) = 54.05

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.54 FLOW VELOCITY(FEET/SEC.) = 7.63
 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.) = 12.22
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.928
 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" B 9.70 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 17.00 0.30 1.000 63
 NATURAL FAIR COVER
 "OPEN BRUSH" B 36.60 0.30 1.000 66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 63.30 SUBAREA RUNOFF(CFS) = 92.72
 EFFECTIVE AREA(ACRES) = 100.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 100.2 PEAK FLOW RATE(CFS) = 146.78

 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

OF-7

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.841
 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" B 0.60 0.30 1.000 69
 NATURAL FAIR COVER
 "OPEN BRUSH" B 0.70 0.30 1.000 66
 NATURAL FAIR COVER
 "WOODLAND,GRASS" B 0.90 0.30 1.000 65
 NATURAL FAIR COVER
 "GRASS" B 0.90 0.30 1.000 69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 149.20
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.73
 AVERAGE FLOW DEPTH(FEET) = 2.26 TRAVEL TIME(MIN.) = 1.04
 Tc(MIN.) = 13.26
 SUBAREA AREA(ACRES) = 3.50 SUBAREA RUNOFF(CFS) = 4.85
 EFFECTIVE AREA(ACRES) = 103.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 103.7 PEAK FLOW RATE(CFS) = 146.78
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

OF-8

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 2.25 FLOW VELOCITY(FEET/SEC.) = 9.70
 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.) = 13.26
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.841
 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" B 3.80 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 4.20 0.30 1.000 63
 NATURAL FAIR COVER
 "WOODLAND,GRASS" B 5.10 0.30 1.000 65
 NATURAL FAIR COVER
 "OPEN BRUSH" B 7.00 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 12.00 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 32.10 SUBAREA RUNOFF(CFS) = 44.52
 EFFECTIVE AREA(ACRES) = 135.80 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 135.8 PEAK FLOW RATE(CFS) = 188.35

OF-8

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FLOW PROCESS FROM NODE 925.00 TO NODE 926.00 IS CODE = 51
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>>>>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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.689
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" B 0.50 0.30 1.000 69
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 0.70 0.30 1.000 63
NATURAL FAIR COVER
"WOODLAND,GRASS" B 2.30 0.30 1.000 65
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" B 3.20 0.30 1.000 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 195.61
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.68
AVERAGE FLOW DEPTH(FEET) = 3.12 TRAVEL TIME(MIN.) = 2.20
Tc(MIN.) = 15.47
SUBAREA AREA(ACRES) = 11.60 SUBAREA RUNOFF(CFS) = 14.50
EFFECTIVE AREA(ACRES) = 147.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 147.4 PEAK FLOW RATE(CFS) = 188.35
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
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OF-9

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 3.08 FLOW VELOCITY(FEET/SEC.) = 6.63
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.) = 15.47
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.689
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" B 7.40 0.30 1.000 65
NATURAL FAIR COVER
"OPEN BRUSH" B 12.40 0.30 1.000 66
NATURAL FAIR COVER
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OF-9

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"OPEN BRUSH" B 28.20 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 31.40 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 42.40 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 121.80 SUBAREA RUNOFF(CFS) = 152.23
EFFECTIVE AREA(ACRES) = 269.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 269.2 PEAK FLOW RATE(CFS) = 336.45
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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 69.0 INCH PIPE IS 52.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.01
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 336.45
PIPE TRAVEL TIME(MIN.) = 1.40 Tc(MIN.) = 16.86
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.) = 16.86
RAINFALL INTENSITY(INCH/HR) = 1.61
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 269.20
TOTAL STREAM AREA(ACRES) = 269.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 336.45
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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
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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.954
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.454
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" B 0.60 0.30 1.000 63 7.95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 1.16
 TOTAL AREA (ACRES) = 0.60 PEAK FLOW RATE (CFS) = 1.16

 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
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.279

OF-11

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	0.10	0.30	0.900	56
COMMERCIAL	B	0.40	0.30	0.100	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.30	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	4.30	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.927
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.76
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.61
 AVERAGE FLOW DEPTH(FEET) = 0.54 TRAVEL TIME(MIN.) = 1.12
 Tc(MIN.) = 9.07
 SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 9.18
 EFFECTIVE AREA(ACRES) = 5.70 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94
 TOTAL AREA(ACRES) = 5.7 PEAK FLOW RATE(CFS) = 10.25

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.67 FLOW VELOCITY(FEET/SEC.) = 7.65
 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 18.0 INCH PIPE IS 12.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.90
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 10.25
 PIPE TRAVEL TIME(MIN.) = 0.54 Tc(MIN.) = 9.61
 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.) = 9.61
 RAINFALL INTENSITY(INCH/HR) = 2.21
 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.94
 EFFECTIVE STREAM AREA(ACRES) = 5.70
 TOTAL STREAM AREA(ACRES) = 5.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.25

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	64.79	12.75	1.882	0.30(0.24)	0.79	42.5	910.00
2	336.45	16.86	1.609	0.30(0.30)	1.00	269.2	920.00
3	10.25	9.61	2.207	0.30(0.28)	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	348.00	9.61	2.207	0.30(0.29)	0.96	191.1	930.00
2	380.92	12.75	1.882	0.30(0.29)	0.96	251.7	910.00
3	397.91	16.86	1.609	0.30(0.29)	0.97	317.7	920.00
4	386.49	17.57	1.572	0.30(0.29)	0.97	317.7	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 397.91 Tc(MIN.) = 16.86
 EFFECTIVE AREA(ACRES) = 317.65 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 16.86
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.609

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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"	B	0.50	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.10	0.30	0.900	56
RESIDENTIAL					

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".4 DWELLING/ACRE"      B      3.00   0.30   0.900   56
COMMERCIAL              B      5.90   0.30   0.100   56
COMMERCIAL              B      7.70   0.30   0.100   56
COMMERCIAL              B     13.60   0.30   0.100   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.237
SUBAREA AREA (ACRES) = 32.80   SUBAREA RUNOFF (CFS) = 45.39
EFFECTIVE AREA (ACRES) = 350.45   AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.90
TOTAL AREA (ACRES) = 350.5   PEAK FLOW RATE (CFS) = 422.04

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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)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 426.00   DOWNSTREAM(FEET) = 370.00
FLOW LENGTH(FEET) = 896.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 33.21
ESTIMATED PIPE DIAMETER (INCH) = 54.00   NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 422.04
PIPE TRAVEL TIME (MIN.) = 0.45   Tc (MIN.) = 17.31
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.) = 17.31
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.585
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          B      0.60   0.30  0.100  56
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" B      2.20   0.30  0.900  56
RESIDENTIAL
".4 DWELLING/ACRE" B      0.30   0.30  0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA (ACRES) = 9.40   SUBAREA RUNOFF (CFS) = 12.07
EFFECTIVE AREA (ACRES) = 359.85   AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.89
TOTAL AREA (ACRES) = 359.9   PEAK FLOW RATE (CFS) = 426.66

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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 57.0 INCH PIPE IS 43.3 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 29.56
ESTIMATED PIPE DIAMETER (INCH) = 57.00   NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 426.66
PIPE TRAVEL TIME (MIN.) = 0.49   Tc (MIN.) = 17.80
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<<<<
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TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 17.80
RAINFALL INTENSITY (INCH/HR) = 1.56
AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.89
EFFECTIVE STREAM AREA (ACRES) = 359.85
TOTAL STREAM AREA (ACRES) = 359.90
PEAK FLOW RATE (CFS) AT CONFLUENCE = 426.66

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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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.500
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" B      0.10   0.30  1.000  63  7.69
NATURAL FAIR COVER
"OPEN BRUSH"         B      1.10   0.30  1.000  66  7.69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 2.38
TOTAL AREA (ACRES) = 1.20   PEAK FLOW RATE (CFS) = 2.38

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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 OF-14

MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.235

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"	B	1.50	0.30	1.000	65
NATURAL FAIR COVER "CHAPARRAL, BROADLEAF"	B	3.60	0.30	1.000	63
NATURAL FAIR COVER "OPEN BRUSH"	B	10.20	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 17.47

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 9.88

AVERAGE FLOW DEPTH (FEET) = 0.77 TRAVEL TIME (MIN.) = 1.70

Tc (MIN.) = 9.39

SUBAREA AREA (ACRES) = 17.30 SUBAREA RUNOFF (CFS) = 30.13

EFFECTIVE AREA (ACRES) = 18.50 AREA-AVERAGED Fm (INCH/HR) = 0.30

AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00

TOTAL AREA (ACRES) = 18.5 PEAK FLOW RATE (CFS) = 32.22

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 0.97 FLOW VELOCITY (FEET/SEC.) = 11.51

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 21.0 INCH PIPE IS 14.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 18.63
ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 32.22
PIPE TRAVEL TIME (MIN.) = 0.93 Tc (MIN.) = 10.32
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.) = 10.32
RAINFALL INTENSITY (INCH/HR) = 2.12
AREA-AVERAGED Fm (INCH/HR) = 0.30

AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA (ACRES) = 18.50
TOTAL STREAM AREA (ACRES) = 18.50
PEAK FLOW RATE (CFS) AT CONFLUENCE = 32.22

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 2.162

OF-15

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"	B	0.40	0.30	1.000	66	9.96
NATURAL FAIR COVER "OPEN BRUSH"	B	1.00	0.30	1.000	66	9.96

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 2.35
TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 2.35

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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.983

OF-16

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 "OPEN BRUSH"	B	0.40	0.30	1.000	66
NATURAL FAIR COVER "GRASS"	B	0.60	0.30	1.000	69
NATURAL FAIR COVER "GRASS"	B	0.70	0.30	1.000	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 3.71
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.41
AVERAGE FLOW DEPTH (FEET) = 0.53 TRAVEL TIME (MIN.) = 1.66
Tc (MIN.) = 11.62

SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 2.73
EFFECTIVE AREA (ACRES) = 3.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 3.2 PEAK FLOW RATE (CFS) = 4.85

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.58 FLOW VELOCITY (FEET/SEC.) = 4.76
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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) =	1.867		

OF-17

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	0.60	0.30	1.000	63
NATURAL FAIR COVER					
"GRASS"	B	1.50	0.30	1.000	69
NATURAL FAIR COVER					
"GRASS"	B	1.70	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.40	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	7.20	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 15.02
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 10.30
AVERAGE FLOW DEPTH (FEET) = 0.70 TRAVEL TIME (MIN.) = 1.31
Tc (MIN.) = 12.93
SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 20.31
EFFECTIVE AREA (ACRES) = 17.60 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 17.6 PEAK FLOW RATE (CFS) = 24.83

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.84 FLOW VELOCITY (FEET/SEC.) = 11.67
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

* 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.761

OF-18

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					
"OPEN BRUSH"	B	0.10	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	66
NATURAL FAIR COVER					
"GRASS"	B	2.10	0.30	1.000	69
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	8.90	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	14.80	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 42.32
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 11.16
AVERAGE FLOW DEPTH (FEET) = 1.12 TRAVEL TIME (MIN.) = 1.43
Tc (MIN.) = 14.36
SUBAREA AREA (ACRES) = 26.60 SUBAREA RUNOFF (CFS) = 34.97
EFFECTIVE AREA (ACRES) = 44.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 44.2 PEAK FLOW RATE (CFS) = 58.10

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.26 FLOW VELOCITY (FEET/SEC.) = 12.13
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
* 5 YEAR RAINFALL INTENSITY (INCH/HR) =	1.663		

OF-19

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"	B	0.40	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.40	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.90	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	5.20	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	9.50	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 69.45
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.82
 AVERAGE FLOW DEPTH(FEET) = 1.62 TRAVEL TIME(MIN.) = 1.54
 Tc(MIN.) = 15.90
 SUBAREA AREA(ACRES) = 18.50 SUBAREA RUNOFF(CFS) = 22.69
 EFFECTIVE AREA(ACRES) = 62.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 62.7 PEAK FLOW RATE(CFS) = 76.90

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.68 FLOW VELOCITY(FEET/SEC.) = 9.05
 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
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.589

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"	B	1.20	0.30	1.000	69
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	3.60	0.30	1.000	65
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) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 85.84
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.03
 AVERAGE FLOW DEPTH(FEET) = 1.89 TRAVEL TIME(MIN.) = 1.33
 Tc(MIN.) = 17.23
 SUBAREA AREA(ACRES) = 15.40 SUBAREA RUNOFF(CFS) = 17.87
 EFFECTIVE AREA(ACRES) = 78.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 78.1 PEAK FLOW RATE(CFS) = 90.61

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.93 FLOW VELOCITY(FEET/SEC.) = 8.15
 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.) = 17.23
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.589
 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	14.30	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	21.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 35.90 SUBAREA RUNOFF(CFS) = 41.65
 EFFECTIVE AREA(ACRES) = 114.00 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 114.0 PEAK FLOW RATE(CFS) = 132.26

 FLOW PROCESS FROM NODE 956.00 TO NODE 956.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 17.23
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.589
 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	0.30	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	0.60	0.30	1.000	63
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	2.30	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	3.20	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 7.77
 EFFECTIVE AREA(ACRES) = 120.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 120.7 PEAK FLOW RATE(CFS) = 140.04

 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 39.0 INCH PIPE IS 30.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.98
 ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 140.04
 PIPE TRAVEL TIME(MIN.) = 1.09 Tc(MIN.) = 18.32

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.) = 18.32
RAINFALL INTENSITY(INCH/HR) = 1.54
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 120.70
TOTAL STREAM AREA(ACRES) = 120.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 140.04

** CONFLUENCE DATA **

Table with 8 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 8 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) = 587.81 Tc(MIN.) = 17.80
EFFECTIVE AREA(ACRES) = 495.65 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 17.80
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.560
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. Contains multiple rows of data for various land uses like COMMERCIAL, RESIDENTIAL.

FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 17.80
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.560
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 8.00 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 11.02
EFFECTIVE AREA(ACRES) = 550.35 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 553.8 PEAK FLOW RATE(CFS) = 646.80

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 553.8 TC(MIN.) = 17.80
EFFECTIVE AREA(ACRES) = 550.35 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.848
PEAK FLOW RATE(CFS) = 646.80

** 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. Contains 6 rows of data.

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:
Michael Baker International
5 Hutton Centre Drive, Suite 500
Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-4 SUBAREA F *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 25-YR EV JULY 2018 CCHIU *

FILE NAME: PA4F25EV.DAT
TIME/DATE OF STUDY: 15:18 08/06/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
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 WIDTH (FT)	GUTTER-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 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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.273
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"	B	0.70	0.30	1.000	63	13.76
NATURAL FAIR COVER "OPEN BRUSH"	B	0.50	0.30	1.000	66	13.76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 2.13
TOTAL AREA(ACRES) = 1.20 PEAK FLOW RATE(CFS) = 2.13

F-1

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 4.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.12
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.13
PIPE TRAVEL TIME(MIN.) = 2.97 Tc(MIN.) = 16.73
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.) = 16.73
RAINFALL INTENSITY(INCH/HR) = 2.03
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 1.20
TOTAL STREAM AREA(ACRES) = 1.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.13

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

OF-1

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.142
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.070
 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"	B	0.10	0.30	1.000	63	8.14
NATURAL FAIR COVER						
"CHAPARRAL,BROADLEAF"	B	0.50	0.30	1.000	63	8.14
NATURAL FAIR COVER						
"OPEN BRUSH"	B	1.00	0.30	1.000	66	8.14

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 3.99
 TOTAL AREA(ACRES) = 1.60 PEAK FLOW RATE(CFS) = 3.99

 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
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.867

OF-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					
"CHAPARRAL,BROADLEAF"	B	1.00	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	2.30	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.00	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.66
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.41
 AVERAGE FLOW DEPTH(FEET) = 0.66 TRAVEL TIME(MIN.) = 1.03
 Tc(MIN.) = 9.17
 SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 11.32
 EFFECTIVE AREA(ACRES) = 6.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 6.5 PEAK FLOW RATE(CFS) = 15.02

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.78 FLOW VELOCITY(FEET/SEC.) = 8.33
 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
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.651

OF-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"	B	0.10	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	4.60	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	4.00	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.60	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	2.70	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	5.10	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.12
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.63
 AVERAGE FLOW DEPTH(FEET) = 1.20 TRAVEL TIME(MIN.) = 1.35
 Tc(MIN.) = 10.52
 SUBAREA AREA(ACRES) = 17.10 SUBAREA RUNOFF(CFS) = 36.18
 EFFECTIVE AREA(ACRES) = 23.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 23.6 PEAK FLOW RATE(CFS) = 49.93

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.40 FLOW VELOCITY(FEET/SEC.) = 8.48
 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 33.0 INCH PIPE IS 24.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 10.62
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 49.93
 PIPE TRAVEL TIME(MIN.) = 1.40 Tc(MIN.) = 11.92
 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.) = 11.92
 RAINFALL INTENSITY (INCH/HR) = 2.47
 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA (ACRES) = 23.60
 TOTAL STREAM AREA (ACRES) = 23.60
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 49.93

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.13	16.73	2.032	0.30 (0.30)	1.00	1.2	900.00
2	49.93	11.92	2.468	0.30 (0.30)	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	51.83	11.92	2.468	0.30 (0.30)	1.00	24.5	910.00
2	42.02	16.73	2.032	0.30 (0.30)	1.00	24.8	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 51.83 Tc (MIN.) = 11.92
 EFFECTIVE AREA (ACRES) = 24.45 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 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.) = 11.92 F-2
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.468
 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					
"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"	B	0.10	0.30	1.000	63
COMMERCIAL	B	1.00	0.30	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.175
 SUBAREA AREA (ACRES) = 7.10 SUBAREA RUNOFF (CFS) = 15.44
 EFFECTIVE AREA (ACRES) = 31.55 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.81
 TOTAL AREA (ACRES) = 31.9 PEAK FLOW RATE (CFS) = 63.15

FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 11.92 F-2
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.468
 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"	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"	B	3.20	0.30	1.000	63
COMMERCIAL	B	3.40	0.30	0.100	56
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.30	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.712
 SUBAREA AREA (ACRES) = 10.90 SUBAREA RUNOFF (CFS) = 22.12
 EFFECTIVE AREA (ACRES) = 42.45 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.79
 TOTAL AREA (ACRES) = 42.8 PEAK FLOW RATE (CFS) = 85.26

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 30.0 INCH PIPE IS 24.0 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 20.29
 ESTIMATED PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 85.26
 PIPE TRAVEL TIME (MIN.) = 0.54 Tc (MIN.) = 12.45
 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.) = 12.45
 RAINFALL INTENSITY (INCH/HR) = 2.41
 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.79
 EFFECTIVE STREAM AREA (ACRES) = 42.45
 TOTAL STREAM AREA (ACRES) = 42.80

PEAK FLOW RATE(CFS) AT CONFLUENCE = 85.26

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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.161
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.

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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.922

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, NATURAL FAIR COVER, OPEN BRUSH, and SUBAREA AVERAGE PERVIOUS LOSS RATE.

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 34.45

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.06 FLOW VELOCITY(FEET/SEC.) = 10.16
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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.706

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 NATURAL FAIR COVER, CHAPARRAL,BROADLEAF, WOODLAND,GRASS, NATURAL FAIR COVER, OPEN BRUSH, and SUBAREA AVERAGE PERVIOUS LOSS RATE.

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.40 FLOW VELOCITY(FEET/SEC.) = 8.13
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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.466

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 NATURAL FAIR COVER, WOODLAND,GRASS.

NATURAL FAIR COVER
 "WOODLAND,GRASS" B 0.80 0.30 1.000 65
 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" B 5.20 0.30 1.000 65
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 6.30 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 62.29
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.91
 AVERAGE FLOW DEPTH(FEET) = 1.62 TRAVEL TIME(MIN.) = 1.79
 Tc(MIN.) = 11.94
 SUBAREA AREA(ACRES) = 14.80 SUBAREA RUNOFF(CFS) = 28.85
 EFFECTIVE AREA(ACRES) = 36.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 36.9 PEAK FLOW RATE(CFS) = 71.92

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.71 FLOW VELOCITY(FEET/SEC.) = 8.24
 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.) = 11.94
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.466
 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" B 9.70 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 17.00 0.30 1.000 63
 NATURAL FAIR COVER
 "OPEN BRUSH" B 36.60 0.30 1.000 66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 63.30 SUBAREA RUNOFF(CFS) = 123.37
 EFFECTIVE AREA(ACRES) = 100.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 100.2 PEAK FLOW RATE(CFS) = 195.29

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

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.358
 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" B 0.60 0.30 1.000 69
 NATURAL FAIR COVER
 "OPEN BRUSH" B 0.70 0.30 1.000 66
 NATURAL FAIR COVER
 "WOODLAND,GRASS" B 0.90 0.30 1.000 65
 NATURAL FAIR COVER
 "GRASS" B 0.90 0.30 1.000 69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 198.53
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.46
 AVERAGE FLOW DEPTH(FEET) = 2.51 TRAVEL TIME(MIN.) = 0.97
 Tc(MIN.) = 12.90
 SUBAREA AREA(ACRES) = 3.50 SUBAREA RUNOFF(CFS) = 6.48
 EFFECTIVE AREA(ACRES) = 103.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 103.7 PEAK FLOW RATE(CFS) = 195.29
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

OF-8

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 2.50 FLOW VELOCITY(FEET/SEC.) = 10.42
 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.) = 12.90
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.358
 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" B 3.80 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 4.20 0.30 1.000 63
 NATURAL FAIR COVER
 "WOODLAND,GRASS" B 5.10 0.30 1.000 65
 NATURAL FAIR COVER
 "OPEN BRUSH" B 7.00 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 12.00 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 32.10 SUBAREA RUNOFF(CFS) = 59.45
 EFFECTIVE AREA(ACRES) = 135.80 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 135.8 PEAK FLOW RATE(CFS) = 251.52

OF-8

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FLOW PROCESS FROM NODE 925.00 TO NODE 926.00 IS CODE = 51
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>>>>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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.167
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" B 0.50 0.30 1.000 69
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 0.70 0.30 1.000 63
NATURAL FAIR COVER
"WOODLAND,GRASS" B 2.30 0.30 1.000 65
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" B 3.20 0.30 1.000 69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 261.27
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.18
AVERAGE FLOW DEPTH(FEET) = 3.48 TRAVEL TIME(MIN.) = 2.05
Tc(MIN.) = 14.96
SUBAREA AREA(ACRES) = 11.60 SUBAREA RUNOFF(CFS) = 19.49
EFFECTIVE AREA(ACRES) = 147.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 147.4 PEAK FLOW RATE(CFS) = 251.52
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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OF-9

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 3.43 FLOW VELOCITY(FEET/SEC.) = 7.12
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.) = 14.96
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.167
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" B 7.40 0.30 1.000 65
NATURAL FAIR COVER
"OPEN BRUSH" B 12.40 0.30 1.000 66
NATURAL FAIR COVER

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"OPEN BRUSH" B 28.20 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 31.40 0.30 1.000 63
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 42.40 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 121.80 SUBAREA RUNOFF(CFS) = 204.64
EFFECTIVE AREA(ACRES) = 269.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 269.2 PEAK FLOW RATE(CFS) = 452.30

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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 75.0 INCH PIPE IS 60.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.01
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 452.30
PIPE TRAVEL TIME(MIN.) = 1.31 Tc(MIN.) = 16.27
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.) = 16.27
RAINFALL INTENSITY(INCH/HR) = 2.06
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 269.20
TOTAL STREAM AREA(ACRES) = 269.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 452.30

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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

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.954
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.111
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.)

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OF-10

NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 0.60 0.30 1.000 63 7.95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 1.52
 TOTAL AREA (ACRES) = 0.60 PEAK FLOW RATE (CFS) = 1.52

 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
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.898

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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"	B	0.10	0.30	0.900	56
COMMERCIAL	B	0.40	0.30	0.100	56
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.30	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	4.30	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.927
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.54
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.03
 AVERAGE FLOW DEPTH(FEET) = 0.60 TRAVEL TIME(MIN.) = 1.05
 Tc(MIN.) = 9.00
 SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 12.02
 EFFECTIVE AREA(ACRES) = 5.70 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94
 TOTAL AREA(ACRES) = 5.7 PEAK FLOW RATE(CFS) = 13.43

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.74 FLOW VELOCITY(FEET/SEC.) = 8.24
 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 13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.51
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 13.43
 PIPE TRAVEL TIME(MIN.) = 0.50 Tc(MIN.) = 9.50
 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.) = 9.50
 RAINFALL INTENSITY(INCH/HR) = 2.81
 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.94
 EFFECTIVE STREAM AREA(ACRES) = 5.70
 TOTAL STREAM AREA(ACRES) = 5.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.43

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	85.26	12.45	2.406	0.30(0.24)	0.79	42.5	910.00
1	69.14	17.28	1.994	0.30(0.24)	0.79	42.8	900.00
2	452.30	16.27	2.065	0.30(0.30)	1.00	269.2	920.00
3	13.43	9.50	2.810	0.30(0.28)	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	466.26	9.50	2.810	0.30(0.29)	0.96	195.3	930.00
2	509.82	12.45	2.406	0.30(0.29)	0.96	254.2	910.00
3	534.30	16.27	2.065	0.30(0.29)	0.97	317.6	920.00
4	512.52	17.28	1.994	0.30(0.29)	0.97	317.7	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 534.30 Tc(MIN.) = 16.27
 EFFECTIVE AREA(ACRES) = 317.63 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 16.27
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.065

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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"	B	0.50	0.30	0.900	56
RESIDENTIAL					
".4 DWELLING/ACRE"	B	2.10	0.30	0.900	56
RESIDENTIAL					

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".4 DWELLING/ACRE"      B      3.00   0.30   0.900   56
COMMERCIAL              B      5.90   0.30   0.100   56
COMMERCIAL              B      7.70   0.30   0.100   56
COMMERCIAL              B     13.60   0.30   0.100   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.237
SUBAREA AREA (ACRES) = 32.80   SUBAREA RUNOFF (CFS) = 58.86
EFFECTIVE AREA (ACRES) = 350.43   AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.90
TOTAL AREA (ACRES) = 350.5   PEAK FLOW RATE (CFS) = 565.87

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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)<<<<
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ELEVATION DATA: UPSTREAM(FEET) = 426.00   DOWNSTREAM(FEET) = 370.00
FLOW LENGTH(FEET) = 896.00   MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 45.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 35.68
ESTIMATED PIPE DIAMETER (INCH) = 60.00   NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 565.87
PIPE TRAVEL TIME (MIN.) = 0.42   Tc (MIN.) = 16.69
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.) = 16.69
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.035
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          B      0.60   0.30  0.100  56
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" B      2.20   0.30  0.900  56
RESIDENTIAL
".4 DWELLING/ACRE" B      0.30   0.30  0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA (ACRES) = 9.40   SUBAREA RUNOFF (CFS) = 15.88
EFFECTIVE AREA (ACRES) = 359.83   AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.89
TOTAL AREA (ACRES) = 359.9   PEAK FLOW RATE (CFS) = 572.34

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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 63.0 INCH PIPE IS 49.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 31.68
ESTIMATED PIPE DIAMETER (INCH) = 63.00   NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 572.34
PIPE TRAVEL TIME (MIN.) = 0.46   Tc (MIN.) = 17.15
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<<<<
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TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION (MIN.) = 17.15
RAINFALL INTENSITY (INCH/HR) = 2.00
AREA-AVERAGED Fm (INCH/HR) = 0.27
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.89
EFFECTIVE STREAM AREA (ACRES) = 359.83
TOTAL STREAM AREA (ACRES) = 359.90
PEAK FLOW RATE (CFS) AT CONFLUENCE = 572.34

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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
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 3.172
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" B      0.10   0.30  1.000  63  7.69
NATURAL FAIR COVER
"OPEN BRUSH"         B      1.10   0.30  1.000  66  7.69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 3.10
TOTAL AREA (ACRES) = 1.20   PEAK FLOW RATE (CFS) = 3.10

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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

```

CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 3.000 **OF-14**
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.848
 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"	B	1.50	0.30	1.000	65
NATURAL FAIR COVER "CHAPARRAL, BROADLEAF"	B	3.60	0.30	1.000	63
NATURAL FAIR COVER "OPEN BRUSH"	B	10.20	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 22.98
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 10.56
 AVERAGE FLOW DEPTH (FEET) = 0.85 TRAVEL TIME (MIN.) = 1.59
 Tc (MIN.) = 9.28
 SUBAREA AREA (ACRES) = 17.30 SUBAREA RUNOFF (CFS) = 39.67
 EFFECTIVE AREA (ACRES) = 18.50 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 18.5 PEAK FLOW RATE (CFS) = 42.42

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 1.07 FLOW VELOCITY (FEET/SEC.) = 12.28
 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 15.3 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 20.05
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 42.42
 PIPE TRAVEL TIME (MIN.) = 0.87 Tc (MIN.) = 10.15
 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.) = 10.15
 RAINFALL INTENSITY (INCH/HR) = 2.71
 AREA-AVERAGED Fm (INCH/HR) = 0.30

AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA (ACRES) = 18.50
 TOTAL STREAM AREA (ACRES) = 18.50
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 42.42

 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 **OF-15**
 SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 9.965
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.734
 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"	B	0.40	0.30	1.000	66	9.96
NATURAL FAIR COVER "OPEN BRUSH"	B	1.00	0.30	1.000	66	9.96

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF (CFS) = 3.07
 TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 3.07

 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

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.519 **OF-16**
 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 "OPEN BRUSH"	B	0.40	0.30	1.000	66
NATURAL FAIR COVER "GRASS"	B	0.60	0.30	1.000	69
NATURAL FAIR COVER "GRASS"	B	0.70	0.30	1.000	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 4.87
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 4.78
 AVERAGE FLOW DEPTH (FEET) = 0.58 TRAVEL TIME (MIN.) = 1.53
 Tc (MIN.) = 11.50

SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 3.60
EFFECTIVE AREA (ACRES) = 3.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 3.2 PEAK FLOW RATE (CFS) = 6.39

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.65 FLOW VELOCITY (FEET/SEC.) = 5.11
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
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.378

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"	B	0.60	0.30	1.000	63
NATURAL FAIR COVER					
"GRASS"	B	1.50	0.30	1.000	69
NATURAL FAIR COVER					
"GRASS"	B	1.70	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.40	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	7.20	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 19.86
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 11.07
AVERAGE FLOW DEPTH (FEET) = 0.77 TRAVEL TIME (MIN.) = 1.22
Tc (MIN.) = 12.72
SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 26.93
EFFECTIVE AREA (ACRES) = 17.60 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 17.6 PEAK FLOW RATE (CFS) = 32.91

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.93 FLOW VELOCITY (FEET/SEC.) = 12.59
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

* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.247

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"	B	0.10	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.10	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	66
NATURAL FAIR COVER					
"GRASS"	B	2.10	0.30	1.000	69
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	8.90	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	14.80	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 56.22
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 12.03
AVERAGE FLOW DEPTH (FEET) = 1.25 TRAVEL TIME (MIN.) = 1.32
Tc (MIN.) = 14.04
SUBAREA AREA (ACRES) = 26.60 SUBAREA RUNOFF (CFS) = 46.60
EFFECTIVE AREA (ACRES) = 44.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 44.2 PEAK FLOW RATE (CFS) = 77.44

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.41 FLOW VELOCITY (FEET/SEC.) = 13.01
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
* 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.125

OF-19

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"	B	0.40	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.40	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.90	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	5.20	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	9.50	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 92.64
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.47
 AVERAGE FLOW DEPTH(FEET) = 1.81 TRAVEL TIME(MIN.) = 1.43
 Tc(MIN.) = 15.47
 SUBAREA AREA(ACRES) = 18.50 SUBAREA RUNOFF(CFS) = 30.39
 EFFECTIVE AREA(ACRES) = 62.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 62.7 PEAK FLOW RATE(CFS) = 102.99

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.88 FLOW VELOCITY(FEET/SEC.) = 9.72
 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
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.034

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"	B	1.20	0.30	1.000	69
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	3.60	0.30	1.000	65
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) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 115.00
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.67
 AVERAGE FLOW DEPTH(FEET) = 2.10 TRAVEL TIME(MIN.) = 1.24
 Tc(MIN.) = 16.71
 SUBAREA AREA(ACRES) = 15.40 SUBAREA RUNOFF(CFS) = 24.03
 EFFECTIVE AREA(ACRES) = 78.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 78.1 PEAK FLOW RATE(CFS) = 121.85

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 2.15 FLOW VELOCITY(FEET/SEC.) = 8.80
 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.) = 16.71
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.034 **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	14.30	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	21.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 35.90 SUBAREA RUNOFF(CFS) = 56.01
 EFFECTIVE AREA(ACRES) = 114.00 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 114.0 PEAK FLOW RATE(CFS) = 177.86

 FLOW PROCESS FROM NODE 956.00 TO NODE 956.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 MAINLINE Tc(MIN.) = 16.71
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.034 **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"	B	0.30	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	0.60	0.30	1.000	63
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	2.30	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	3.20	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 10.45
 EFFECTIVE AREA(ACRES) = 120.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 120.7 PEAK FLOW RATE(CFS) = 188.31

 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 45.0 INCH PIPE IS 32.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 21.78
 ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 188.31
 PIPE TRAVEL TIME(MIN.) = 1.00 Tc(MIN.) = 17.71

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.) = 17.71
RAINFALL INTENSITY(INCH/HR) = 1.97
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 120.70
TOTAL STREAM AREA(ACRES) = 120.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 188.31

** CONFLUENCE DATA **

Table with 8 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 8 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) = 788.73 Tc(MIN.) = 17.15
EFFECTIVE AREA(ACRES) = 495.22 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 17.15
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.004
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. Contains multiple rows of data for various land uses like COMMERCIAL, RESIDENTIAL.

FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 17.15
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.004
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 8.00 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 14.21
EFFECTIVE AREA(ACRES) = 549.92 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 553.8 PEAK FLOW RATE(CFS) = 865.70

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 553.8 TC(MIN.) = 17.15
EFFECTIVE AREA(ACRES) = 549.92 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.848
PEAK FLOW RATE(CFS) = 865.70

** 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. Contains 6 rows of data.

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:

Michael Baker International
5 Hutton Centre Drive, Suite 500
Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-4 SUBAREA F *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 50-YR EV AUG 2018 CCHIU *

FILE NAME: PA4F50EV.DAT
TIME/DATE OF STUDY: 15:17 08/06/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 15.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 4.440
- 2) 10.00; 3.010
- 3) 15.00; 2.390
- 4) 20.00; 2.030
- 5) 25.00; 1.790
- 6) 30.00; 1.600
- 7) 40.00; 1.370
- 8) 50.00; 1.200
- 9) 60.00; 1.060
- 10) 90.00; 0.860
- 11) 120.00; 0.730
- 12) 180.00; 0.590
- 13) 360.00; 0.410
- 14) 1200.00; 0.170

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-	CROWN TO	STREET-CROSSFALL:		CURB HEIGHT (FT)	GUTTER-GEOMETRIES:			MANNING (n)
	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / SIDE/ WAY		WIDTH (FT)	LIP (FT)	HIKE (FT)	
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 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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.544

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"	B	0.70	0.30	1.000	63	13.76
NATURAL FAIR COVER "OPEN BRUSH"	B	0.50	0.30	1.000	66	13.76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 2.42
TOTAL AREA(ACRES) = 1.20 PEAK FLOW RATE(CFS) = 2.42

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 4.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.35
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.42
PIPE TRAVEL TIME(MIN.) = 2.86 Tc(MIN.) = 16.62
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.) = 16.62
RAINFALL INTENSITY(INCH/HR) = 2.27
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30

AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA (ACRES) = 1.20
TOTAL STREAM AREA (ACRES) = 1.20
PEAK FLOW RATE (CFS) AT CONFLUENCE = 2.42

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
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 3.541
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" B 0.10 0.30 1.000 63 8.14
NATURAL FAIR COVER
"CHAPARRAL, BROADLEAF" B 0.50 0.30 1.000 63 8.14
NATURAL FAIR COVER
"OPEN BRUSH" B 1.00 0.30 1.000 66 8.14
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF (CFS) = 4.67
TOTAL AREA (ACRES) = 1.60 PEAK FLOW RATE (CFS) = 4.67

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
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 3.257

OF-2

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 1.00 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 0.60 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL, BROADLEAF" B 2.30 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 1.00 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 11.20
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.68
AVERAGE FLOW DEPTH (FEET) = 0.70 TRAVEL TIME (MIN.) = 0.99

Tc (MIN.) = 9.14
SUBAREA AREA (ACRES) = 4.90 SUBAREA RUNOFF (CFS) = 13.04
EFFECTIVE AREA (ACRES) = 6.50 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 6.5 PEAK FLOW RATE (CFS) = 17.30

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.82 FLOW VELOCITY (FEET/SEC.) = 8.59
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
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.955

OF-3

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" B 0.10 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL, BROADLEAF" B 4.60 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 4.00 0.30 1.000 66
NATURAL FAIR COVER
"WOODLAND, GRASS" B 0.60 0.30 1.000 65
NATURAL FAIR COVER
"CHAPARRAL, BROADLEAF" B 2.70 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 5.10 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 37.75
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.88
AVERAGE FLOW DEPTH (FEET) = 1.26 TRAVEL TIME (MIN.) = 1.31
Tc (MIN.) = 10.44
SUBAREA AREA (ACRES) = 17.10 SUBAREA RUNOFF (CFS) = 40.86
EFFECTIVE AREA (ACRES) = 23.60 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 23.6 PEAK FLOW RATE (CFS) = 56.40

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.47 FLOW VELOCITY (FEET/SEC.) = 8.70
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 24.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.06
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 56.40
 PIPE TRAVEL TIME(MIN.) = 1.34 Tc(MIN.) = 11.78
 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.) = 11.78
 RAINFALL INTENSITY(INCH/HR) = 2.79
 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA(ACRES) = 23.60
 TOTAL STREAM AREA(ACRES) = 23.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 56.40

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.42	16.62	2.273	0.30(0.30)	1.00	1.2	900.00
2	56.40	11.78	2.789	0.30(0.30)	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	58.56	11.78	2.789	0.30(0.30)	1.00	24.5	910.00
2	47.13	16.62	2.273	0.30(0.30)	1.00	24.8	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 58.56 Tc(MIN.) = 11.78
 EFFECTIVE AREA(ACRES) = 24.45 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 11.78
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.789
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 NATURAL FAIR COVER

"CHAPARRAL,BROADLEAF" B 0.20 0.30 1.000 63 F-2
 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" B 0.10 0.30 1.000 63
 COMMERCIAL B 1.00 0.30 0.100 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.175
 SUBAREA AREA(ACRES) = 7.10 SUBAREA RUNOFF(CFS) = 17.49
 EFFECTIVE AREA(ACRES) = 31.55 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.81
 TOTAL AREA(ACRES) = 31.9 PEAK FLOW RATE(CFS) = 72.26

 FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

 MAINLINE Tc(MIN.) = 11.78
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.789 F-2
 SUBAREA LOSS RATE DATA(AMC II):
 DEVELOPMENT TYPE/ SCSSOIL AREA Fp Ap SCSS
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 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" B 3.20 0.30 1.000 63
 COMMERCIAL B 3.40 0.30 0.100 56
 NATURAL FAIR COVER
 "OPEN BRUSH" B 3.30 0.30 1.000 66
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.70 0.30 0.900 56
 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.712
 SUBAREA AREA(ACRES) = 10.90 SUBAREA RUNOFF(CFS) = 25.26
 EFFECTIVE AREA(ACRES) = 42.45 AREA-AVERAGED Fm(INCH/HR) = 0.24
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.79
 TOTAL AREA(ACRES) = 42.8 PEAK FLOW RATE(CFS) = 97.52

 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 23.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 21.36
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 97.52
 PIPE TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 12.29
 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.) = 12.29
RAINFALL INTENSITY(INCH/HR) = 2.73
AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.79
EFFECTIVE STREAM AREA(ACRES) = 42.45
TOTAL STREAM AREA(ACRES) = 42.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 97.52

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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

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.737
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.657
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
"OPEN BRUSH" B 0.20 0.30 1.000 66 7.74
NATURAL FAIR COVER
"OPEN BRUSH" B 0.70 0.30 1.000 66 7.74
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 2.72
TOTAL AREA(ACRES) = 0.90 PEAK FLOW RATE(CFS) = 2.72

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OF-4

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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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.345
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" B 0.20 0.30 1.000 65
NATURAL FAIR COVER

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OF-5

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"CHAPARRAL,BROADLEAF" B 1.00 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 1.40 0.30 1.000 66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 4.40 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 6.70 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.53
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.07
AVERAGE FLOW DEPTH(FEET) = 0.89 TRAVEL TIME(MIN.) = 1.09
Tc(MIN.) = 8.83
SUBAREA AREA(ACRES) = 13.70 SUBAREA RUNOFF(CFS) = 37.54
EFFECTIVE AREA(ACRES) = 14.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 40.01

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.12 FLOW VELOCITY(FEET/SEC.) = 10.55
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
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>>>>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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.003
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 0.70 0.30 1.000 63
NATURAL FAIR COVER
"WOODLAND,GRASS" B 1.40 0.30 1.000 65
NATURAL FAIR COVER
"OPEN BRUSH" B 5.40 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 49.14
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.19
AVERAGE FLOW DEPTH(FEET) = 1.41 TRAVEL TIME(MIN.) = 1.23
Tc(MIN.) = 10.06
SUBAREA AREA(ACRES) = 7.50 SUBAREA RUNOFF(CFS) = 18.24
EFFECTIVE AREA(ACRES) = 22.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 22.1 PEAK FLOW RATE(CFS) = 53.76

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.46 FLOW VELOCITY(FEET/SEC.) = 8.38
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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.787

OF-7

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 NATURAL FAIR COVER, WOODLAND, GRASS, OPEN BRUSH, CHAPARRAL, BROADLEAF.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 70.34
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.15
AVERAGE FLOW DEPTH(FEET) = 1.70 TRAVEL TIME(MIN.) = 1.74
Tc(MIN.) = 11.80
SUBAREA AREA(ACRES) = 14.80 SUBAREA RUNOFF(CFS) = 33.13
EFFECTIVE AREA(ACRES) = 36.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 36.9 PEAK FLOW RATE(CFS) = 82.60

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.80 FLOW VELOCITY(FEET/SEC.) = 8.52
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.) = 11.80
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.787

OF-7

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 NATURAL FAIR COVER, OPEN BRUSH, CHAPARRAL, BROADLEAF.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA AREA(ACRES) = 63.30 SUBAREA RUNOFF(CFS) = 141.70
EFFECTIVE AREA(ACRES) = 100.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 100.2 PEAK FLOW RATE(CFS) = 224.31

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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.671

OF-8

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 NATURAL FAIR COVER, CHAPARRAL, BROADLEAF, WOODLAND, GRASS, OPEN BRUSH.

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 228.04
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.82
AVERAGE FLOW DEPTH(FEET) = 2.65 TRAVEL TIME(MIN.) = 0.93
Tc(MIN.) = 12.73
SUBAREA AREA(ACRES) = 3.50 SUBAREA RUNOFF(CFS) = 7.47
EFFECTIVE AREA(ACRES) = 103.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 103.7 PEAK FLOW RATE(CFS) = 224.31
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.64 FLOW VELOCITY(FEET/SEC.) = 10.77
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.) = 12.73
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.671

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. Row includes NATURAL FAIR COVER.

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"OPEN BRUSH" B 3.80 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 4.20 0.30 1.000 63
 NATURAL FAIR COVER
 "WOODLAND,GRASS" B 5.10 0.30 1.000 65
 NATURAL FAIR COVER
 "OPEN BRUSH" B 7.00 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 12.00 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 32.10 SUBAREA RUNOFF(CFS) = 68.51
 EFFECTIVE AREA(ACRES) = 135.80 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 135.8 PEAK FLOW RATE(CFS) = 289.83

 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
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.427

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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" B 0.50 0.30 1.000 69
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 0.70 0.30 1.000 63
 NATURAL FAIR COVER
 "WOODLAND,GRASS" B 2.30 0.30 1.000 65
 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" B 3.20 0.30 1.000 69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 300.94
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.46
 AVERAGE FLOW DEPTH(FEET) = 3.67 TRAVEL TIME(MIN.) = 1.97
 Tc(MIN.) = 14.71
 SUBAREA AREA(ACRES) = 11.60 SUBAREA RUNOFF(CFS) = 22.20
 EFFECTIVE AREA(ACRES) = 147.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 147.4 PEAK FLOW RATE(CFS) = 289.83
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 3.62 FLOW VELOCITY(FEET/SEC.) = 7.38
 LONGEST FLOWPATH FROM NODE 920.00 TO NODE 926.00 = 3824.00 FEET.

 FLOW PROCESS FROM NODE 926.00 TO NODE 926.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

OF-9

MAINLINE Tc(MIN.) = 14.71
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.427
 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" B 7.40 0.30 1.000 65
 NATURAL FAIR COVER
 "OPEN BRUSH" B 12.40 0.30 1.000 66
 NATURAL FAIR COVER
 "OPEN BRUSH" B 28.20 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 31.40 0.30 1.000 63
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 42.40 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 121.80 SUBAREA RUNOFF(CFS) = 233.11
 EFFECTIVE AREA(ACRES) = 269.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 269.2 PEAK FLOW RATE(CFS) = 515.22

 FLOW PROCESS FROM NODE 926.00 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) = 440.00 DOWNSTREAM(FEET) = 426.00
 FLOW LENGTH(FEET) = 1341.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 81.0 INCH PIPE IS 61.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.81
 ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 515.22
 PIPE TRAVEL TIME(MIN.) = 1.25 Tc(MIN.) = 15.96
 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.) = 15.96
 RAINFALL INTENSITY(INCH/HR) = 2.32
 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA(ACRES) = 269.20
 TOTAL STREAM AREA(ACRES) = 269.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 515.22

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*****
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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.595
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" B 0.60 0.30 1.000 63 7.95
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.78
TOTAL AREA(ACRES) = 0.60 PEAK FLOW RATE(CFS) = 1.78

*****
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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.307
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" B 0.10 0.30 0.900 56
COMMERCIAL B 0.40 0.30 0.100 56
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.30 0.30 1.000 65
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 4.30 0.30 1.000 63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.927
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.74
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.33
AVERAGE FLOW DEPTH(FEET) = 0.63 TRAVEL TIME(MIN.) = 1.01
Tc(MIN.) = 8.96
SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 13.90
EFFECTIVE AREA(ACRES) = 5.70 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94
TOTAL AREA(ACRES) = 5.7 PEAK FLOW RATE(CFS) = 15.53

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.78 FLOW VELOCITY(FEET/SEC.) = 8.48
LONGEST FLOWPATH FROM NODE 930.00 TO NODE 932.00 = 773.00 FEET.

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*****
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 14.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.76
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 15.53
PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 9.44
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.) = 9.44
RAINFALL INTENSITY(INCH/HR) = 3.17
AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.94
EFFECTIVE STREAM AREA(ACRES) = 5.70
TOTAL STREAM AREA(ACRES) = 5.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.53

** CONFLUENCE DATA **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 97.52 12.29 2.726 0.30( 0.24) 0.79 42.5 910.00
1 78.43 17.16 2.234 0.30( 0.24) 0.79 42.8 900.00
2 515.22 15.96 2.321 0.30( 0.30) 1.00 269.2 920.00
3 15.53 9.44 3.169 0.30( 0.28) 0.94 5.7 930.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
1 536.60 9.44 3.169 0.30( 0.29) 0.96 197.6 930.00
2 587.00 12.29 2.726 0.30( 0.29) 0.96 255.5 910.00
3 609.34 15.96 2.321 0.30( 0.29) 0.97 317.6 920.00
4 582.04 17.16 2.234 0.30( 0.29) 0.97 317.7 900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 609.34 Tc(MIN.) = 15.96
EFFECTIVE AREA(ACRES) = 317.61 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.97
TOTAL AREA(ACRES) = 317.7
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 = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 15.96
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.321 F-3
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"   B         0.50     0.30     0.900     56
RESIDENTIAL
".4 DWELLING/ACRE"   B         2.10     0.30     0.900     56
RESIDENTIAL
".4 DWELLING/ACRE"   B         3.00     0.30     0.900     56
COMMERCIAL           B         5.90     0.30     0.100     56
COMMERCIAL           B         7.70     0.30     0.100     56
COMMERCIAL           B        13.60     0.30     0.100     56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.237
SUBAREA AREA(ACRES) = 32.80     SUBAREA RUNOFF(CFS) = 66.42
EFFECTIVE AREA(ACRES) = 350.41   AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.90
TOTAL AREA(ACRES) = 350.5     PEAK FLOW RATE(CFS) = 646.62

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*****
FLOW PROCESS FROM NODE 903.00 TO NODE 904.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 426.00 DOWNSTREAM(FEET) = 370.00
FLOW LENGTH(FEET) = 896.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 36.87
ESTIMATED PIPE DIAMETER(INCH) = 63.00     NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 646.62
PIPE TRAVEL TIME(MIN.) = 0.41     Tc(MIN.) = 16.37
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
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.37
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.292 F-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         3.80     0.30     0.100     56
COMMERCIAL           B         0.60     0.30     0.100     56
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

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".4 DWELLING/ACRE"   B         2.20     0.30     0.900     56
RESIDENTIAL
".4 DWELLING/ACRE"   B         0.30     0.30     0.900     56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA(ACRES) = 9.40     SUBAREA RUNOFF(CFS) = 18.05
EFFECTIVE AREA(ACRES) = 359.81   AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.89
TOTAL AREA(ACRES) = 359.9     PEAK FLOW RATE(CFS) = 655.47

```

```

*****
FLOW PROCESS FROM NODE 904.00 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) = 370.00 DOWNSTREAM(FEET) = 330.00
FLOW LENGTH(FEET) = 872.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 51.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 32.70
ESTIMATED PIPE DIAMETER(INCH) = 66.00     NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 655.47
PIPE TRAVEL TIME(MIN.) = 0.44     Tc(MIN.) = 16.81
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
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 16.81
RAINFALL INTENSITY(INCH/HR) = 2.26
AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.89
EFFECTIVE STREAM AREA(ACRES) = 359.81
TOTAL STREAM AREA(ACRES) = 359.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 655.47

```

```

*****
FLOW PROCESS FROM NODE 940.00 TO NODE 941.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.670 OF-13
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"   B         0.10     0.30     1.000     63   7.69

```

NATURAL FAIR COVER
 "OPEN BRUSH" B 1.10 0.30 1.000 66 7.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 3.64
 TOTAL AREA (ACRES) = 1.20 PEAK FLOW RATE (CFS) = 3.64

 FLOW PROCESS FROM NODE 941.00 TO NODE 942.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 675.00 DOWNSTREAM(FEET) = 405.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1008.00 CHANNEL SLOPE = 0.2679
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 30.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.227

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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					
"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"	B	1.50	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	3.60	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	10.20	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.55
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.85
 AVERAGE FLOW DEPTH(FEET) = 0.90 TRAVEL TIME(MIN.) = 1.55
 Tc(MIN.) = 9.24
 SUBAREA AREA(ACRES) = 17.30 SUBAREA RUNOFF(CFS) = 45.58
 EFFECTIVE AREA(ACRES) = 18.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 18.5 PEAK FLOW RATE(CFS) = 48.74

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.13 FLOW VELOCITY(FEET/SEC.) = 12.68
 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 16.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.57

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 48.74
 PIPE TRAVEL TIME(MIN.) = 0.84 Tc(MIN.) = 10.08
 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.) = 10.08
 RAINFALL INTENSITY(INCH/HR) = 3.00
 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA(ACRES) = 18.50
 TOTAL STREAM AREA(ACRES) = 18.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 48.74

 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
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.020

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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						
"OPEN BRUSH"	B	0.40	0.30	1.000	66	9.96
NATURAL FAIR COVER						
"OPEN BRUSH"	B	1.00	0.30	1.000	66	9.96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30						
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000						
SUBAREA RUNOFF(CFS) = 3.43						
TOTAL AREA(ACRES) = 1.40 PEAK FLOW RATE(CFS) = 3.43						

 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
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.831
 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					

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
NATURAL FAIR COVER "OPEN BRUSH"	B	0.10	0.30	1.000	66
NATURAL FAIR COVER "OPEN BRUSH"	B	0.40	0.30	1.000	66
NATURAL FAIR COVER "GRASS"	B	0.60	0.30	1.000	69
NATURAL FAIR COVER "GRASS"	B	0.70	0.30	1.000	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.48
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.95
AVERAGE FLOW DEPTH(FEET) = 0.61 TRAVEL TIME(MIN.) = 1.48
Tc(MIN.) = 11.44
SUBAREA AREA(ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 4.10
EFFECTIVE AREA(ACRES) = 3.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 7.29

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.68 FLOW VELOCITY(FEET/SEC.) = 5.23
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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.685
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	0.60	0.30	1.000	63
NATURAL FAIR COVER "GRASS"	B	1.50	0.30	1.000	69
NATURAL FAIR COVER "GRASS"	B	1.70	0.30	1.000	69
NATURAL FAIR COVER "OPEN BRUSH"	B	3.40	0.30	1.000	66
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	B	7.20	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 22.75
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.46
AVERAGE FLOW DEPTH(FEET) = 0.81 TRAVEL TIME(MIN.) = 1.18
Tc(MIN.) = 12.62
SUBAREA AREA(ACRES) = 14.40 SUBAREA RUNOFF(CFS) = 30.91
EFFECTIVE AREA(ACRES) = 17.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 17.6 PEAK FLOW RATE(CFS) = 37.78

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.98 FLOW VELOCITY(FEET/SEC.) = 13.08
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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.526
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 "OPEN BRUSH"	B	0.10	0.30	1.000	66
NATURAL FAIR COVER "OPEN BRUSH"	B	0.60	0.30	1.000	66
NATURAL FAIR COVER "GRASS"	B	2.10	0.30	1.000	69
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	B	8.90	0.30	1.000	63
NATURAL FAIR COVER "OPEN BRUSH"	B	14.80	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 64.43
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 12.42
AVERAGE FLOW DEPTH(FEET) = 1.32 TRAVEL TIME(MIN.) = 1.28
Tc(MIN.) = 13.90
SUBAREA AREA(ACRES) = 26.60 SUBAREA RUNOFF(CFS) = 53.29
EFFECTIVE AREA(ACRES) = 44.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 44.2 PEAK FLOW RATE(CFS) = 88.55

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.48 FLOW VELOCITY(FEET/SEC.) = 13.42
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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.369
SUBAREA LOSS RATE DATA(AMC II):

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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"	B	0.40	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.40	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.90	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	5.20	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	9.50	0.30	1.000	63

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 1.97 FLOW VELOCITY (FEET/SEC.) = 10.02
 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

OF-20

* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.283
 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"	B	1.20	0.30	1.000	69
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	3.60	0.30	1.000	65
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) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 130.51

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 8.93
 AVERAGE FLOW DEPTH (FEET) = 2.21 TRAVEL TIME (MIN.) = 1.20
 Tc (MIN.) = 16.49
 SUBAREA AREA (ACRES) = 15.40 SUBAREA RUNOFF (CFS) = 27.48
 EFFECTIVE AREA (ACRES) = 78.10 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 78.1 PEAK FLOW RATE (CFS) = 139.37

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 2.26 FLOW VELOCITY (FEET/SEC.) = 9.09
 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.) = 16.49
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.283
 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	14.30	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	21.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA (ACRES) = 35.90 SUBAREA RUNOFF (CFS) = 64.07
 EFFECTIVE AREA (ACRES) = 114.00 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 114.0 PEAK FLOW RATE (CFS) = 203.44

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 FLOW PROCESS FROM NODE 956.00 TO NODE 956.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc (MIN.) = 16.49
 * 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.283
 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	0.30	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	0.60	0.30	1.000	63
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	2.30	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	3.20	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA (ACRES) = 6.70 SUBAREA RUNOFF (CFS) = 11.96
 EFFECTIVE AREA (ACRES) = 120.70 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00

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TOTAL AREA (ACRES) = 120.7 PEAK FLOW RATE (CFS) = 215.40

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 34.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 22.62
ESTIMATED PIPE DIAMETER (INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 215.40
PIPE TRAVEL TIME (MIN.) = 0.96 Tc (MIN.) = 17.45
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.) = 17.45
RAINFALL INTENSITY (INCH/HR) = 2.21
AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA (ACRES) = 120.70
TOTAL STREAM AREA (ACRES) = 120.70
PEAK FLOW RATE (CFS) AT CONFLUENCE = 215.40

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp (Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	603.66	10.31	2.972	0.30 (0.25)	0.85	239.8	930.00
1	646.92	13.14	2.620	0.30 (0.26)	0.87	297.7	910.00
1	655.47	16.81	2.260	0.30 (0.27)	0.89	359.8	920.00
1	627.48	18.02	2.173	0.30 (0.27)	0.89	359.9	900.00
2	48.74	10.08	3.000	0.30 (0.30)	1.00	18.5	940.00
3	215.40	17.45	2.214	0.30 (0.30)	1.00	120.7	950.00

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	820.90	10.08	3.000	0.30 (0.27)	0.89	322.8	940.00
2	829.55	10.31	2.972	0.30 (0.27)	0.89	329.6	930.00
3	885.53	13.14	2.620	0.30 (0.27)	0.90	407.1	910.00
4	903.35	16.81	2.260	0.30 (0.28)	0.92	494.6	920.00
5	890.60	17.45	2.214	0.30 (0.28)	0.92	499.1	950.00
6	872.08	18.02	2.173	0.30 (0.28)	0.92	499.1	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 903.35 Tc (MIN.) = 16.81
EFFECTIVE AREA (ACRES) = 494.59 AREA-AVERAGED Fm (INCH/HR) = 0.28
AREA-AVERAGED Fp (INCH/HR) = 0.30 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.) = 16.81
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.260
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 12.30 0.30 0.100 56
COMMERCIAL B 26.80 0.30 0.100 56
COMMERCIAL B 2.00 0.30 0.100 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.70 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 0.80 0.30 0.900 56
RESIDENTIAL
".4 DWELLING/ACRE" B 2.10 0.30 0.900 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.196
SUBAREA AREA (ACRES) = 46.70 SUBAREA RUNOFF (CFS) = 92.51
EFFECTIVE AREA (ACRES) = 541.29 AREA-AVERAGED Fm (INCH/HR) = 0.26
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.86
TOTAL AREA (ACRES) = 545.8 PEAK FLOW RATE (CFS) = 975.32

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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.) = 16.81
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.260
SUBAREA LOSS RATE DATA (AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 8.00 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA (ACRES) = 8.00 SUBAREA RUNOFF (CFS) = 16.05
EFFECTIVE AREA (ACRES) = 549.29 AREA-AVERAGED Fm (INCH/HR) = 0.25
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.85
TOTAL AREA (ACRES) = 553.8 PEAK FLOW RATE (CFS) = 991.38

F-5

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 553.8 TC (MIN.) = 16.81
EFFECTIVE AREA (ACRES) = 549.29 AREA-AVERAGED Fm (INCH/HR) = 0.25
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.848
PEAK FLOW RATE (CFS) = 991.38

** PEAK FLOW RATE TABLE **

STREAM	Q	Tc	Intensity	Fp (Fm)	Ap	Ae	HEADWATER
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NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)		(ACRES)	NODE
1	939.05	10.08	3.000	0.30 (0.24)	0.79	377.5	940.00
2	946.10	10.31	2.972	0.30 (0.24)	0.79	384.3	930.00
3	986.93	13.14	2.620	0.30 (0.25)	0.82	461.8	910.00
4	991.38	16.81	2.260	0.30 (0.25)	0.85	549.3	920.00
5	976.31	17.45	2.214	0.30 (0.25)	0.85	553.8	950.00
6	955.97	18.02	2.173	0.30 (0.25)	0.85	553.8	900.00

=====
 END OF RATIONAL METHOD ANALYSIS

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"	B	0.10	0.30	1.000	63	8.14
NATURAL FAIR COVER						
"CHAPARRAL,BROADLEAF"	B	0.50	0.30	1.000	63	8.14
NATURAL FAIR COVER						
"OPEN BRUSH"	B	1.00	0.30	1.000	66	8.14

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 4.84
 TOTAL AREA(ACRES) = 1.60 PEAK FLOW RATE(CFS) = 4.84

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) = 3.434

OF-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					
"CHAPARRAL,BROADLEAF"	B	1.00	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	2.30	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	1.00	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.75
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.84
 AVERAGE FLOW DEPTH(FEET) = 0.71 TRAVEL TIME(MIN.) = 0.97
 Tc(MIN.) = 9.11
 SUBAREA AREA(ACRES) = 4.90 SUBAREA RUNOFF(CFS) = 13.82
 EFFECTIVE AREA(ACRES) = 6.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 6.5 PEAK FLOW RATE(CFS) = 18.33

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.84 FLOW VELOCITY(FEET/SEC.) = 8.74
 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) = 3.186

OF-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"	B	0.10	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	4.60	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	4.00	0.30	1.000	66
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	0.60	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	2.70	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	5.10	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 40.56
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.00
 AVERAGE FLOW DEPTH(FEET) = 1.30 TRAVEL TIME(MIN.) = 1.29
 Tc(MIN.) = 10.40
 SUBAREA AREA(ACRES) = 17.10 SUBAREA RUNOFF(CFS) = 44.42
 EFFECTIVE AREA(ACRES) = 23.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 23.6 PEAK FLOW RATE(CFS) = 61.31

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.52 FLOW VELOCITY(FEET/SEC.) = 8.90
 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 26.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.21
 ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 61.31
 PIPE TRAVEL TIME(MIN.) = 1.32 Tc(MIN.) = 11.72
 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.) = 11.72
 RAINFALL INTENSITY (INCH/HR) = 2.98
 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA (ACRES) = 23.60
 TOTAL STREAM AREA (ACRES) = 23.60
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 61.31

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2.61	16.56	2.449	0.30 (0.30)	1.00	1.2	900.00
2	61.31	11.72	2.978	0.30 (0.30)	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	63.61	11.72	2.978	0.30 (0.30)	1.00	24.4	910.00
2	51.82	16.56	2.449	0.30 (0.30)	1.00	24.8	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 63.61 Tc (MIN.) = 11.72
 EFFECTIVE AREA (ACRES) = 24.45 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 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.) = 11.72
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.978 **F-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					
"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"	B	0.10	0.30	1.000	63
COMMERCIAL	B	1.00	0.30	0.100	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.175
 SUBAREA AREA (ACRES) = 7.10 SUBAREA RUNOFF (CFS) = 18.69
 EFFECTIVE AREA (ACRES) = 31.55 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.81
 TOTAL AREA (ACRES) = 31.9 PEAK FLOW RATE (CFS) = 77.62

 FLOW PROCESS FROM NODE 902.00 TO NODE 902.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc (MIN.) = 11.72
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 2.978 **F-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"	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"	B	3.20	0.30	1.000	63
COMMERCIAL	B	3.40	0.30	0.100	56
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.30	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	0.70	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.712
 SUBAREA AREA (ACRES) = 10.90 SUBAREA RUNOFF (CFS) = 27.12
 EFFECTIVE AREA (ACRES) = 42.45 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.79
 TOTAL AREA (ACRES) = 42.8 PEAK FLOW RATE (CFS) = 104.73

 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 25.2 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 21.55
 ESTIMATED PIPE DIAMETER (INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 104.73
 PIPE TRAVEL TIME (MIN.) = 0.51 Tc (MIN.) = 12.23
 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.) = 12.23
 RAINFALL INTENSITY (INCH/HR) = 2.91
 AREA-AVERAGED Fm (INCH/HR) = 0.24
 AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.79
 EFFECTIVE STREAM AREA (ACRES) = 42.45
 TOTAL STREAM AREA (ACRES) = 42.80

PEAK FLOW RATE(CFS) AT CONFLUENCE = 104.73

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):

OF-4

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
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.499

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, NATURAL FAIR COVER, OPEN BRUSH, and SUBAREA AVERAGE PERVIOUS LOSS RATE.

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 14.6 PEAK FLOW RATE(CFS) = 42.04

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.14 FLOW VELOCITY(FEET/SEC.) = 10.75
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
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.253

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 NATURAL FAIR COVER, CHAPARRAL,BROADLEAF, WOODLAND,GRASS, NATURAL FAIR COVER, OPEN BRUSH, and SUBAREA AVERAGE PERVIOUS LOSS RATE.

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.51 FLOW VELOCITY(FEET/SEC.) = 8.55
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
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.978

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 NATURAL FAIR COVER, WOODLAND,GRASS.

NATURAL FAIR COVER
 "WOODLAND,GRASS" B 0.80 0.30 1.000 65
 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" B 5.20 0.30 1.000 65
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 6.30 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 76.59
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.34
 AVERAGE FLOW DEPTH(FEET) = 1.75 TRAVEL TIME(MIN.) = 1.70
 Tc(MIN.) = 11.72
 SUBAREA AREA(ACRES) = 14.80 SUBAREA RUNOFF(CFS) = 35.67
 EFFECTIVE AREA(ACRES) = 36.90 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 36.9 PEAK FLOW RATE(CFS) = 88.93

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.85 FLOW VELOCITY(FEET/SEC.) = 8.67
 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.) = 11.72
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.978
 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" B 9.70 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 17.00 0.30 1.000 63
 NATURAL FAIR COVER
 "OPEN BRUSH" B 36.60 0.30 1.000 66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 63.30 SUBAREA RUNOFF(CFS) = 152.55
 EFFECTIVE AREA(ACRES) = 100.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 100.2 PEAK FLOW RATE(CFS) = 241.48

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

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.853
 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" B 0.60 0.30 1.000 69
 NATURAL FAIR COVER
 "OPEN BRUSH" B 0.70 0.30 1.000 66
 NATURAL FAIR COVER
 "WOODLAND,GRASS" B 0.90 0.30 1.000 65
 NATURAL FAIR COVER
 "GRASS" B 0.90 0.30 1.000 69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 245.50
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.01
 AVERAGE FLOW DEPTH(FEET) = 2.73 TRAVEL TIME(MIN.) = 0.92
 Tc(MIN.) = 12.64
 SUBAREA AREA(ACRES) = 3.50 SUBAREA RUNOFF(CFS) = 8.04
 EFFECTIVE AREA(ACRES) = 103.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 103.7 PEAK FLOW RATE(CFS) = 241.48
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

OF-8

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 2.71 FLOW VELOCITY(FEET/SEC.) = 11.00
 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.) = 12.64
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.853
 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" B 3.80 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 4.20 0.30 1.000 63
 NATURAL FAIR COVER
 "WOODLAND,GRASS" B 5.10 0.30 1.000 65
 NATURAL FAIR COVER
 "OPEN BRUSH" B 7.00 0.30 1.000 66
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 12.00 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 32.10 SUBAREA RUNOFF(CFS) = 73.76
 EFFECTIVE AREA(ACRES) = 135.80 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 135.8 PEAK FLOW RATE(CFS) = 312.06

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) = 2.632
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"             B         0.50   0.30   1.000   69
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B         0.70   0.30   1.000   63
NATURAL FAIR COVER
"WOODLAND,GRASS"   B         2.30   0.30   1.000   65
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"             B         3.20   0.30   1.000   69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 324.23
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.60
AVERAGE FLOW DEPTH(FEET) = 3.77 TRAVEL TIME(MIN.) = 1.94
Tc(MIN.) = 14.58
SUBAREA AREA(ACRES) = 11.60 SUBAREA RUNOFF(CFS) = 24.34
EFFECTIVE AREA(ACRES) = 147.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 147.4 PEAK FLOW RATE(CFS) = 312.06
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
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OF-9

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 3.72 FLOW VELOCITY(FEET/SEC.) = 7.52
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
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----
MAINLINE Tc(MIN.) = 14.58
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.632
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"   B         7.40   0.30   1.000   65
NATURAL FAIR COVER
"OPEN BRUSH"       B        12.40   0.30   1.000   66
NATURAL FAIR COVER
```

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```
"OPEN BRUSH"       B         28.20   0.30   1.000   66
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B         31.40   0.30   1.000   63
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B         42.40   0.30   1.000   63
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 121.80 SUBAREA RUNOFF(CFS) = 255.62
EFFECTIVE AREA(ACRES) = 269.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 269.2 PEAK FLOW RATE(CFS) = 564.96
```

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*****
FLOW PROCESS FROM NODE 926.00 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) = 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 63.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.24
ESTIMATED PIPE DIAMETER(INCH) = 84.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 564.96
PIPE TRAVEL TIME(MIN.) = 1.23 Tc(MIN.) = 15.81
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
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
-----
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 15.81
RAINFALL INTENSITY(INCH/HR) = 2.51
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 269.20
TOTAL STREAM AREA(ACRES) = 269.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 564.96
```

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*****
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
* 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" B 0.60 0.30 1.000 63 7.95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 1.84
 TOTAL AREA (ACRES) = 0.60 PEAK FLOW RATE (CFS) = 1.84

 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) = 3.469

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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" B 0.10 0.30 0.900 56
 COMMERCIAL B 0.40 0.30 0.100 56
 NATURAL FAIR COVER
 "WOODLAND,GRASS" B 0.30 0.30 1.000 65
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF" B 4.30 0.30 1.000 63
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.927
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.17
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.38
 AVERAGE FLOW DEPTH(FEET) = 0.64 TRAVEL TIME(MIN.) = 1.00
 Tc(MIN.) = 8.95
 SUBAREA AREA(ACRES) = 5.10 SUBAREA RUNOFF(CFS) = 14.64
 EFFECTIVE AREA(ACRES) = 5.70 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.94
 TOTAL AREA(ACRES) = 5.7 PEAK FLOW RATE(CFS) = 16.35

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.80 FLOW VELOCITY(FEET/SEC.) = 8.60
 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 15.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.83
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 16.35
 PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 9.43
 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.) = 9.43
 RAINFALL INTENSITY(INCH/HR) = 3.37
 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.30
 AREA-AVERAGED Ap = 0.94
 EFFECTIVE STREAM AREA(ACRES) = 5.70
 TOTAL STREAM AREA(ACRES) = 5.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.35

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	104.73	12.23	2.907	0.30(0.24)	0.79	42.4	910.00
1	85.22	17.10	2.405	0.30(0.24)	0.79	42.8	900.00
2	564.96	15.81	2.514	0.30(0.30)	1.00	269.2	920.00
3	16.35	9.43	3.368	0.30(0.28)	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	578.11	9.43	3.368	0.30(0.29)	0.96	199.1	930.00
2	633.32	12.23	2.907	0.30(0.29)	0.96	256.4	910.00
3	667.18	15.81	2.514	0.30(0.29)	0.97	317.6	920.00
4	633.61	17.10	2.405	0.30(0.29)	0.97	317.7	900.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 667.18 Tc(MIN.) = 15.81
 EFFECTIVE AREA(ACRES) = 317.61 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 15.81
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.514

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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" B 0.50 0.30 0.900 56
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 2.10 0.30 0.900 56
 RESIDENTIAL


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".4 DWELLING/ACRE"      B      3.00   0.30   0.900   56
COMMERCIAL              B      5.90   0.30   0.100   56
COMMERCIAL              B      7.70   0.30   0.100   56
COMMERCIAL              B     13.60   0.30   0.100   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.237
SUBAREA AREA(ACRES) = 32.80   SUBAREA RUNOFF(CFS) = 72.13
EFFECTIVE AREA(ACRES) = 350.41   AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.90
TOTAL AREA(ACRES) = 350.5   PEAK FLOW RATE(CFS) = 707.63

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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 48.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 37.87
ESTIMATED PIPE DIAMETER(INCH) = 66.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 707.63
PIPE TRAVEL TIME(MIN.) = 0.39   Tc(MIN.) = 16.20
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.) = 16.20
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.480
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          B      0.60   0.30  0.100  56
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" B      2.20   0.30  0.900  56
RESIDENTIAL
".4 DWELLING/ACRE" B      0.30   0.30  0.900  56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
SUBAREA AREA(ACRES) = 9.40   SUBAREA RUNOFF(CFS) = 19.64
EFFECTIVE AREA(ACRES) = 359.81   AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.30   AREA-AVERAGED Ap = 0.89
TOTAL AREA(ACRES) = 359.9   PEAK FLOW RATE(CFS) = 716.29

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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 52.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 33.61
ESTIMATED PIPE DIAMETER(INCH) = 69.00   NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 716.29
PIPE TRAVEL TIME(MIN.) = 0.43   Tc(MIN.) = 16.64
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.) = 16.64
RAINFALL INTENSITY(INCH/HR) = 2.44
AREA-AVERAGED Fm(INCH/HR) = 0.27
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.89
EFFECTIVE STREAM AREA(ACRES) = 359.81
TOTAL STREAM AREA(ACRES) = 359.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 716.29

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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" B      0.10   0.30  1.000  63  7.69
NATURAL FAIR COVER
"OPEN BRUSH"         B      1.10   0.30  1.000  66  7.69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 3.76
TOTAL AREA(ACRES) = 1.20   PEAK FLOW RATE(CFS) = 3.76

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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) = 3.413

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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 "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"	B	1.50	0.30	1.000	65
NATURAL FAIR COVER "CHAPARRAL, BROADLEAF"	B	3.60	0.30	1.000	63
NATURAL FAIR COVER "OPEN BRUSH"	B	10.20	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 28.07
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 11.05
 AVERAGE FLOW DEPTH (FEET) = 0.92 TRAVEL TIME (MIN.) = 1.52
 Tc (MIN.) = 9.21
 SUBAREA AREA (ACRES) = 17.30 SUBAREA RUNOFF (CFS) = 48.47
 EFFECTIVE AREA (ACRES) = 18.50 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 18.5 PEAK FLOW RATE (CFS) = 51.83

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 1.16 FLOW VELOCITY (FEET/SEC.) = 12.91
 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 17.8 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 20.75
 ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 51.83
 PIPE TRAVEL TIME (MIN.) = 0.84 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) = 0.30

AREA-AVERAGED Fp (INCH/HR) = 0.30
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA (ACRES) = 18.50
 TOTAL STREAM AREA (ACRES) = 18.50
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 51.83

 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
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.265

OF-15

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"	B	0.40	0.30	1.000	66	9.96
NATURAL FAIR COVER "OPEN BRUSH"	B	1.00	0.30	1.000	66	9.96

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF (CFS) = 3.74
 TOTAL AREA (ACRES) = 1.40 PEAK FLOW RATE (CFS) = 3.74

 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
 * 25 YEAR RAINFALL INTENSITY (INCH/HR) = 3.022

OF-16

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 "OPEN BRUSH"	B	0.40	0.30	1.000	66
NATURAL FAIR COVER "GRASS"	B	0.60	0.30	1.000	69
NATURAL FAIR COVER "GRASS"	B	0.70	0.30	1.000	69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 5.94
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.01
 AVERAGE FLOW DEPTH (FEET) = 0.63 TRAVEL TIME (MIN.) = 1.46
 Tc (MIN.) = 11.42

SUBAREA AREA (ACRES) = 1.80 SUBAREA RUNOFF (CFS) = 4.41
EFFECTIVE AREA (ACRES) = 3.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 3.2 PEAK FLOW RATE (CFS) = 7.84

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.70 FLOW VELOCITY (FEET/SEC.) = 5.38
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) = 2.862

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"	B	0.60	0.30	1.000	63
NATURAL FAIR COVER					
"GRASS"	B	1.50	0.30	1.000	69
NATURAL FAIR COVER					
"GRASS"	B	1.70	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	3.40	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	7.20	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 24.44
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 11.70
AVERAGE FLOW DEPTH (FEET) = 0.83 TRAVEL TIME (MIN.) = 1.15
Tc (MIN.) = 12.58
SUBAREA AREA (ACRES) = 14.40 SUBAREA RUNOFF (CFS) = 33.20
EFFECTIVE AREA (ACRES) = 17.60 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 17.6 PEAK FLOW RATE (CFS) = 40.58

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.01 FLOW VELOCITY (FEET/SEC.) = 13.26
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) = 2.711 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"	B	0.10	0.30	1.000	69
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.10	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.60	0.30	1.000	66
NATURAL FAIR COVER					
"GRASS"	B	2.10	0.30	1.000	69
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	8.90	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	14.80	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 69.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 12.64
AVERAGE FLOW DEPTH (FEET) = 1.35 TRAVEL TIME (MIN.) = 1.26
Tc (MIN.) = 13.84
SUBAREA AREA (ACRES) = 26.60 SUBAREA RUNOFF (CFS) = 57.73
EFFECTIVE AREA (ACRES) = 44.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA (ACRES) = 44.2 PEAK FLOW RATE (CFS) = 95.92

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 1.53 FLOW VELOCITY (FEET/SEC.) = 13.68
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) = 2.571

OF-19

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"	B	0.40	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.40	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	2.90	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	5.20	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	9.50	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 114.83
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.99
 AVERAGE FLOW DEPTH(FEET) = 1.96 TRAVEL TIME(MIN.) = 1.36
 Tc(MIN.) = 15.20
 SUBAREA AREA(ACRES) = 18.50 SUBAREA RUNOFF(CFS) = 37.82
 EFFECTIVE AREA(ACRES) = 62.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 62.7 PEAK FLOW RATE(CFS) = 128.17

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 2.04 FLOW VELOCITY(FEET/SEC.) = 10.27
 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) = 2.465

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"	B	1.20	0.30	1.000	69
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	3.60	0.30	1.000	65
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) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 143.18
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.15
 AVERAGE FLOW DEPTH(FEET) = 2.28 TRAVEL TIME(MIN.) = 1.17
 Tc(MIN.) = 16.37
 SUBAREA AREA(ACRES) = 15.40 SUBAREA RUNOFF(CFS) = 30.01
 EFFECTIVE AREA(ACRES) = 78.10 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 78.1 PEAK FLOW RATE(CFS) = 152.21

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 2.34 FLOW VELOCITY(FEET/SEC.) = 9.29
 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.) = 16.37
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.465

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	14.30	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	21.60	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 35.90 SUBAREA RUNOFF(CFS) = 69.97
 EFFECTIVE AREA(ACRES) = 114.00 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 114.0 PEAK FLOW RATE(CFS) = 222.18

 FLOW PROCESS FROM NODE 956.00 TO NODE 956.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc(MIN.) = 16.37
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.465

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"	B	0.30	0.30	1.000	66
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	0.60	0.30	1.000	63
NATURAL FAIR COVER					
"WOODLAND,GRASS"	B	2.30	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL,BROADLEAF"	B	3.20	0.30	1.000	63

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 6.70 SUBAREA RUNOFF(CFS) = 13.06
 EFFECTIVE AREA(ACRES) = 120.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 120.7 PEAK FLOW RATE(CFS) = 235.23

 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 36.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.88
 ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 235.23
 PIPE TRAVEL TIME(MIN.) = 0.95 Tc(MIN.) = 17.32

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.) = 17.32
RAINFALL INTENSITY(INCH/HR) = 2.39
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 120.70
TOTAL STREAM AREA(ACRES) = 120.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 235.23

** CONFLUENCE DATA **

Table with 8 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 8 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) = 985.86 Tc(MIN.) = 16.64
EFFECTIVE AREA(ACRES) = 494.26 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.30 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.) = 16.64
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443
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. Lists various land use categories and their associated values.

FLOW PROCESS FROM NODE 905.00 TO NODE 905.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 16.64
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 8.00 0.30 0.100 56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 17.37
EFFECTIVE AREA(ACRES) = 548.96 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.85
TOTAL AREA(ACRES) = 553.8 PEAK FLOW RATE(CFS) = 1081.28

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 553.8 TC(MIN.) = 16.64
EFFECTIVE AREA(ACRES) = 548.96 AREA-AVERAGED Fm(INCH/HR) = 0.25
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.848
PEAK FLOW RATE(CFS) = 1081.28

** 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. Contains 6 rows of data.

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 SUBAREA G ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 2-YR EV SEPTEMBER 2018 CCHI *

FILE NAME: PA3G02EV.DAT
TIME/DATE OF STUDY: 13:43 09/25/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 1.600
- 2) 10.00; 1.060
- 3) 15.00; 0.840
- 4) 20.00; 0.720
- 5) 25.00; 0.630
- 6) 30.00; 0.560
- 7) 40.00; 0.480
- 8) 50.00; 0.420
- 9) 60.00; 0.366
- 10) 90.00; 0.300
- 11) 120.00; 0.246
- 12) 180.00; 0.190
- 13) 360.00; 0.136
- 14) 1200.00; 0.080

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 HIKE (FT) (FT) (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:

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 500.00 TO NODE 501.00 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) = 300.00 DOWNSTREAM(FEET) = 292.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.507
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.437

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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.)
COMMERCIAL	-	2.60	0.60	0.100	56	6.51

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.22
TOTAL AREA(ACRES) = 2.60 PEAK FLOW RATE(CFS) = 3.22

FLOW PROCESS FROM NODE 501.00 TO NODE 502.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 292.00 DOWNSTREAM ELEVATION(FEET) = 286.00
STREET LENGTH(FEET) = 566.00 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) = 4.99

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.34
HALFSTREET FLOOD WIDTH(FEET) = 10.04
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.28
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.78
STREET FLOW TRAVEL TIME(MIN.) = 4.13 Tc(MIN.) = 10.64
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.032

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
-------------------------------	-------------------	-----------------	-----------------	-----------------	-----------

USER-DEFINED - 3.20 0.60 0.100 - **G-2**
 USER-DEFINED - 1.50 0.60 0.850 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.339
 SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 3.50
 EFFECTIVE AREA(ACRES) = 7.30 AREA-AVERAGED Fm(INCH/HR) = 0.15
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.25
 TOTAL AREA(ACRES) = 7.3 PEAK FLOW RATE(CFS) = 5.78

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 10.82
 FLOW VELOCITY(FEET/SEC.) = 2.33 DEPTH*VELOCITY(FT*FT/SEC.) = 0.83
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 502.00 = 896.00 FEET.

 FLOW PROCESS FROM NODE 502.00 TO NODE 503.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
 ELEVATION DATA: UPSTREAM(FEET) = 286.00 DOWNSTREAM(FEET) = 282.00
 FLOW LENGTH(FEET) = 311.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.43
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.78
 PIPE TRAVEL TIME(MIN.) = 0.81 Tc(MIN.) = 11.45
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 503.00 = 1207.00 FEET.

 FLOW PROCESS FROM NODE 503.00 TO NODE 503.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====
 MAINLINE Tc(MIN.) = 11.45
 * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.996 **G-3**
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	5.60	0.60	0.100	-
USER-DEFINED	-	6.50	0.60	0.850	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503
 SUBAREA AREA(ACRES) = 12.10 SUBAREA RUNOFF(CFS) = 7.56
 EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.41
 TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 13.11
 =====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 19.4 TC(MIN.) = 11.45
 EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.25
 AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 0.409
 PEAK FLOW RATE(CFS) = 13.11
 =====

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:

Michael Baker International
5 Hutton Centre Drive, Suite 500
Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA G ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 5-YR EV SEPTEMBER 2018 CCHIUI *

FILE NAME: PA3G05EV.DAT
TIME/DATE OF STUDY: 13:43 09/25/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 5.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 2.180
- 2) 10.00; 1.510
- 3) 15.00; 1.200
- 4) 20.00; 1.020
- 5) 25.00; 0.900
- 6) 30.00; 0.830
- 7) 40.00; 0.690
- 8) 50.00; 0.610
- 9) 60.00; 0.550
- 10) 90.00; 0.440
- 11) 120.00; 0.370
- 12) 180.00; 0.310
- 13) 360.00; 0.210
- 14) 1200.00; 0.090

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 HIKE (FT) (FT) (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:

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 500.00 TO NODE 501.00 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) = 300.00 DOWNSTREAM(FEET) = 292.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.507
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.978
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	-	2.60	0.50	0.100	56	6.51

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.51
TOTAL AREA(ACRES) = 2.60 PEAK FLOW RATE(CFS) = 4.51

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FLOW PROCESS FROM NODE 501.00 TO NODE 502.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 292.00 DOWNSTREAM ELEVATION(FEET) = 286.00
STREET LENGTH(FEET) = 566.00 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) = 7.32
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.38
HALFSTREET FLOOD WIDTH(FEET) = 11.99
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.48
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.93
STREET FLOW TRAVEL TIME(MIN.) = 3.81 Tc(MIN.) = 10.31
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.491

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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USER-DEFINED - 3.20 0.50 0.100 -
 USER-DEFINED - 1.50 0.50 0.850 -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.339
 SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 5.59
 EFFECTIVE AREA (ACRES) = 7.30 AREA-AVERAGED Fm (INCH/HR) = 0.13
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.25
 TOTAL AREA (ACRES) = 7.3 PEAK FLOW RATE (CFS) = 8.96

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.40 HALFSTREET FLOOD WIDTH (FEET) = 13.09
 FLOW VELOCITY (FEET/SEC.) = 2.60 DEPTH*VELOCITY (FT*FT/SEC.) = 1.03
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 502.00 = 896.00 FEET.

 FLOW PROCESS FROM NODE 502.00 TO NODE 503.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM (FEET) = 286.00 DOWNSTREAM (FEET) = 282.00
 FLOW LENGTH (FEET) = 311.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.1 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 7.10
 ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 8.96
 PIPE TRAVEL TIME (MIN.) = 0.73 Tc (MIN.) = 11.04
 LONGEST FLOWPATH FROM NODE 500.00 TO NODE 503.00 = 1207.00 FEET.

 FLOW PROCESS FROM NODE 503.00 TO NODE 503.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====

MAINLINE Tc (MIN.) = 11.04
 * 5 YEAR RAINFALL INTENSITY (INCH/HR) = 1.445
 SUBAREA LOSS RATE DATA (AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	5.60	0.50	0.100	-
USER-DEFINED	-	6.50	0.50	0.850	-

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503
 SUBAREA AREA (ACRES) = 12.10 SUBAREA RUNOFF (CFS) = 13.00
 EFFECTIVE AREA (ACRES) = 19.40 AREA-AVERAGED Fm (INCH/HR) = 0.20
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.41
 TOTAL AREA (ACRES) = 19.4 PEAK FLOW RATE (CFS) = 21.66
 =====

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END OF STUDY SUMMARY:
 TOTAL AREA (ACRES) = 19.4 TC (MIN.) = 11.04
 EFFECTIVE AREA (ACRES) = 19.40 AREA-AVERAGED Fm (INCH/HR) = 0.20
 AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.409
 PEAK FLOW RATE (CFS) = 21.66
 =====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

Michael Baker International
5 Hutton Centre Drive, Suite 500
Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****

* RMV PA-3 SUBAREA G ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 10-YR EV SEPTEMBER 2018 CCHIU *

FILE NAME: PA3G10EV.DAT
TIME/DATE OF STUDY: 13:42 09/25/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 5.00
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 500.00 TO NODE 501.00 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) = 300.00 DOWNSTREAM(FEET) = 292.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.507

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.747

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	2.60	0.30	0.100	56	6.51

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 6.36
TOTAL AREA(ACRES) = 2.60 PEAK FLOW RATE(CFS) = 6.36

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FLOW PROCESS FROM NODE 501.00 TO NODE 502.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 292.00 DOWNSTREAM ELEVATION(FEET) = 286.00
STREET LENGTH(FEET) = 566.00 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) = 10.73

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.42

HALFSTREET FLOOD WIDTH(FEET) = 14.18

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.70

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.12

STREET FLOW TRAVEL TIME(MIN.) = 3.50 Tc(MIN.) = 10.01

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.157

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.20	0.30	0.100	56
PUBLIC PARK	B	1.50	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.339

SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 8.69

EFFECTIVE AREA(ACRES) = 7.30 AREA-AVERAGED Fm(INCH/HR) = 0.08

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.25

TOTAL AREA(ACRES) = 7.3 PEAK FLOW RATE(CFS) = 13.67

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.66

FLOW VELOCITY(FEET/SEC.) = 2.87 DEPTH*VELOCITY(FT*FT/SEC.) = 1.27

LONGEST FLOWPATH FROM NODE 500.00 TO NODE 502.00 = 896.00 FEET.

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FLOW PROCESS FROM NODE 502.00 TO NODE 503.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 286.00 DOWNSTREAM(FEET) = 282.00
FLOW LENGTH(FEET) = 311.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.88
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.67
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 10.66
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 503.00 = 1207.00 FEET.

FLOW PROCESS FROM NODE 503.00 TO NODE 503.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 10.66
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.081
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 5.60 0.30 0.100 56
PUBLIC PARK B 6.50 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503
SUBAREA AREA(ACRES) = 12.10 SUBAREA RUNOFF(CFS) = 21.02
EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 34.19

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END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 19.4 TC(MIN.) = 10.66
EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.409
PEAK FLOW RATE(CFS) = 34.19

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:

Michael Baker International
5 Hutton Centre Drive, Suite 500
Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA G ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 25-YR EV SEPTEMBER 2018 CCHIU *

FILE NAME: PA3G25EV.DAT
TIME/DATE OF STUDY: 13:41 09/25/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
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 500.00 TO NODE 501.00 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) = 300.00 DOWNSTREAM(FEET) = 292.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.507
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.491
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	2.60	0.30	0.100	56	6.51

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 8.10
TOTAL AREA(ACRES) = 2.60 PEAK FLOW RATE(CFS) = 8.10

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FLOW PROCESS FROM NODE 501.00 TO NODE 502.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====

UPSTREAM ELEVATION(FEET) = 292.00 DOWNSTREAM ELEVATION(FEET) = 286.00
STREET LENGTH(FEET) = 566.00 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) = 13.75
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 15.74
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.86
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.27
STREET FLOW TRAVEL TIME(MIN.) = 3.30 Tc(MIN.) = 9.81

* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.759
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.20	0.30	0.100	56
PUBLIC PARK	B	1.50	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.339
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 11.24
EFFECTIVE AREA(ACRES) = 7.30 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 7.3 PEAK FLOW RATE(CFS) = 17.63

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 17.46
FLOW VELOCITY(FEET/SEC.) = 3.02 DEPTH*VELOCITY(FT*FT/SEC.) = 1.43
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 502.00 = 896.00 FEET.

FLOW PROCESS FROM NODE 502.00 TO NODE 503.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 286.00 DOWNSTREAM(FEET) = 282.00
FLOW LENGTH(FEET) = 311.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.44
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.63
PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 10.42
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 503.00 = 1207.00 FEET.

FLOW PROCESS FROM NODE 503.00 TO NODE 503.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 10.42
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.665
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 5.60 0.30 0.100 56
PUBLIC PARK B 6.50 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503
SUBAREA AREA(ACRES) = 12.10 SUBAREA RUNOFF(CFS) = 27.38
EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 44.38

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END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 19.4 TC(MIN.) = 10.42
EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.409
PEAK FLOW RATE(CFS) = 44.38

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

Michael Baker International
5 Hutton Centre Drive, Suite 500
Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA G ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 50-YR EV SEPTEMBER 2018 CCHI *

FILE NAME: PA3G50EV.DAT
TIME/DATE OF STUDY: 13:41 09/25/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 15.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 4.440
- 2) 10.00; 3.010
- 3) 15.00; 2.390
- 4) 20.00; 2.030
- 5) 25.00; 1.790
- 6) 30.00; 1.600
- 7) 40.00; 1.370
- 8) 50.00; 1.200
- 9) 60.00; 1.060
- 10) 90.00; 0.860
- 11) 120.00; 0.730
- 12) 180.00; 0.590
- 13) 360.00; 0.410
- 14) 1200.00; 0.170

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 HIKE (FT) (FT) (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:

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 500.00 TO NODE 501.00 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) = 300.00 DOWNSTREAM(FEET) = 292.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.507
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 4.009

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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.)
COMMERCIAL	B	2.60	0.30	0.100	56	6.51

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 9.31
TOTAL AREA(ACRES) = 2.60 PEAK FLOW RATE(CFS) = 9.31

FLOW PROCESS FROM NODE 501.00 TO NODE 502.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 292.00 DOWNSTREAM ELEVATION(FEET) = 286.00
STREET LENGTH(FEET) = 566.00 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) = 15.70
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 16.60
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.96
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.36
STREET FLOW TRAVEL TIME(MIN.) = 3.19 Tc(MIN.) = 9.70
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.096

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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COMMERCIAL B 3.20 0.30 0.100 56
PUBLIC PARK B 1.50 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.339
SUBAREA AREA (ACRES) = 4.70 SUBAREA RUNOFF (CFS) = 12.67
EFFECTIVE AREA (ACRES) = 7.30 AREA-AVERAGED Fm (INCH/HR) = 0.08
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.25
TOTAL AREA (ACRES) = 7.3 PEAK FLOW RATE (CFS) = 19.84

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH (FEET) = 0.49 HALFSTREET FLOOD WIDTH (FEET) = 18.32
FLOW VELOCITY (FEET/SEC.) = 3.11 DEPTH*VELOCITY (FT*FT/SEC.) = 1.52
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 502.00 = 896.00 FEET.

FLOW PROCESS FROM NODE 502.00 TO NODE 503.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM (FEET) = 286.00 DOWNSTREAM (FEET) = 282.00
FLOW LENGTH (FEET) = 311.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.5 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 8.64
ESTIMATED PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 19.84
PIPE TRAVEL TIME (MIN.) = 0.60 Tc (MIN.) = 10.30
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 503.00 = 1207.00 FEET.

FLOW PROCESS FROM NODE 503.00 TO NODE 503.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 10.30
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.973

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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	B	5.60	0.30	0.100	56
PUBLIC PARK	B	6.50	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503
SUBAREA AREA (ACRES) = 12.10 SUBAREA RUNOFF (CFS) = 30.73
EFFECTIVE AREA (ACRES) = 19.40 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA (ACRES) = 19.4 PEAK FLOW RATE (CFS) = 49.77

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 19.4 TC (MIN.) = 10.30
EFFECTIVE AREA (ACRES) = 19.40 AREA-AVERAGED Fm (INCH/HR) = 0.12
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.409
PEAK FLOW RATE (CFS) = 49.77

END OF RATIONAL METHOD ANALYSIS

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Analysis prepared by:

Michael Baker International
5 Hutton Centre Drive, Suite 500
Santa Ana, CA 92707

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA G ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 100-YR EV SEPTEMBER 2018 CCHIU *

FILE NAME: PA3G00EV.DAT
TIME/DATE OF STUDY: 13:39 09/25/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 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 500.00 TO NODE 501.00 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) = 300.00 DOWNSTREAM(FEET) = 292.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.507
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.156
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	2.60	0.30	0.100	56	6.51

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 9.65
TOTAL AREA(ACRES) = 2.60 PEAK FLOW RATE(CFS) = 9.65

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FLOW PROCESS FROM NODE 501.00 TO NODE 502.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 292.00 DOWNSTREAM ELEVATION(FEET) = 286.00
STREET LENGTH(FEET) = 566.00 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) = 16.50
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.47
HALFSTREET FLOOD WIDTH(FEET) = 16.99
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.98
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.39
STREET FLOW TRAVEL TIME(MIN.) = 3.17 Tc(MIN.) = 9.68

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.320
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	3.20	0.30	0.100	56
PUBLIC PARK	B	1.50	0.30	0.850	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.339
SUBAREA AREA(ACRES) = 4.70 SUBAREA RUNOFF(CFS) = 13.61
EFFECTIVE AREA(ACRES) = 7.30 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 7.3 PEAK FLOW RATE(CFS) = 21.31

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END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.50 HALFSTREET FLOOD WIDTH(FEET) = 18.79
FLOW VELOCITY(FEET/SEC.) = 3.18 DEPTH*VELOCITY(FT*FT/SEC.) = 1.59
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 502.00 = 896.00 FEET.

FLOW PROCESS FROM NODE 502.00 TO NODE 503.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 286.00 DOWNSTREAM(FEET) = 282.00
FLOW LENGTH(FEET) = 311.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.73
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.31
PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 10.27
LONGEST FLOWPATH FROM NODE 500.00 TO NODE 503.00 = 1207.00 FEET.

FLOW PROCESS FROM NODE 503.00 TO NODE 503.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 10.27
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.210 **G-3**
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 5.60 0.30 0.100 56
PUBLIC PARK B 6.50 0.30 0.850 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.503
SUBAREA AREA(ACRES) = 12.10 SUBAREA RUNOFF(CFS) = 33.31
EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.41
TOTAL AREA(ACRES) = 19.4 PEAK FLOW RATE(CFS) = 53.90

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 19.4 TC(MIN.) = 10.27
EFFECTIVE AREA(ACRES) = 19.40 AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.409
PEAK FLOW RATE(CFS) = 53.90

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-3 SUBAREA O ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 2-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3002EV.DAT
TIME/DATE OF STUDY: 07:38 05/29/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 1.600
- 2) 10.00; 1.060
- 3) 15.00; 0.840
- 4) 20.00; 0.720
- 5) 25.00; 0.630
- 6) 30.00; 0.560
- 7) 40.00; 0.480
- 8) 50.00; 0.420
- 9) 60.00; 0.366
- 10) 90.00; 0.300
- 11) 120.00; 0.246
- 12) 180.00; 0.190
- 13) 360.00; 0.136
- 14) 1200.00; 0.080

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-	CROWN TO	STREET-CROSSFALL:		CURB HEIGHT (FT)	GUTTER-GEOMETRIES:			MANNING FACTOR (n)
	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / SIDE/ WAY		WIDTH (FT)	LIP (FT)	HIKE (FT)	
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
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.065
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"	-	0.80	0.60	1.000	0	9.95

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.34
TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 0.34

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
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.991

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.90	0.60	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.85
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.61
AVERAGE FLOW DEPTH(FEET) = 0.28 TRAVEL TIME(MIN.) = 1.62
Tc(MIN.) = 11.58
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 1.02
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 1.30

O-2

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.33 FLOW VELOCITY(FEET/SEC.) = 4.10
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

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.835

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	14.80	0.60	1.000	-
USER-DEFINED	-	0.10	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.92

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.01

AVERAGE FLOW DEPTH(FEET) = 0.49 TRAVEL TIME(MIN.) = 3.62

Tc(MIN.) = 15.20

SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 3.16

EFFECTIVE AREA(ACRES) = 18.60 AREA-AVERAGED Fm(INCH/HR) = 0.60

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 18.6 PEAK FLOW RATE(CFS) = 3.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.55 FLOW VELOCITY(FEET/SEC.) = 4.31

LONGEST FLOWPATH FROM NODE 600.00 TO NODE 603.00 = 1546.00 FEET.

0-3

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

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.772

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	11.70	0.60	1.000	-
USER-DEFINED	-	1.10	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.991

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.98

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.61

AVERAGE FLOW DEPTH(FEET) = 0.60 TRAVEL TIME(MIN.) = 2.65

Tc(MIN.) = 17.85

SUBAREA AREA(ACRES) = 12.90 SUBAREA RUNOFF(CFS) = 2.05

EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.60

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00

0-4

TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 4.93

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.60 FLOW VELOCITY(FEET/SEC.) = 4.60

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

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.7 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 10.17

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 4.93

PIPE TRAVEL TIME(MIN.) = 4.21 Tc(MIN.) = 22.06

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.) = 22.06

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.683

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	0.10	0.60	1.000	-
USER-DEFINED	-	0.30	0.60	1.000	-
USER-DEFINED	-	1.40	0.60	1.000	-
USER-DEFINED	-	0.60	0.60	1.000	-
USER-DEFINED	-	1.00	0.60	1.000	-
USER-DEFINED	-	8.30	0.60	1.000	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA AREA(ACRES) = 11.70 SUBAREA RUNOFF(CFS) = 0.87

EFFECTIVE AREA(ACRES) = 43.20 AREA-AVERAGED Fm(INCH/HR) = 0.60

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 43.2 PEAK FLOW RATE(CFS) = 4.93

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

0-5

FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 22.06

* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.683

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	5.20	0.60	0.900	-

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60

0-5

SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.900$
SUBAREA AREA (ACRES) = 5.20 SUBAREA RUNOFF (CFS) = 0.67
EFFECTIVE AREA (ACRES) = 48.40 AREA-AVERAGED F_m (INCH/HR) = 0.59
AREA-AVERAGED F_p (INCH/HR) = 0.60 AREA-AVERAGED $A_p = 0.99$
TOTAL AREA (ACRES) = 48.4 PEAK FLOW RATE (CFS) = 4.93
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 48.4 TC (MIN.) = 22.06
EFFECTIVE AREA (ACRES) = 48.40 AREA-AVERAGED F_m (INCH/HR) = 0.59
AREA-AVERAGED F_p (INCH/HR) = 0.60 AREA-AVERAGED $A_p = 0.987$
PEAK FLOW RATE (CFS) = 4.93

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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 SUBAREA O ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 5-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3005EV.DAT
TIME/DATE OF STUDY: 07:33 05/29/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 5.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 2.180
- 2) 10.00; 1.510
- 3) 15.00; 1.200
- 4) 20.00; 1.020
- 5) 25.00; 0.900
- 6) 30.00; 0.830
- 7) 40.00; 0.690
- 8) 50.00; 0.610
- 9) 60.00; 0.550
- 10) 90.00; 0.440
- 11) 120.00; 0.370
- 12) 180.00; 0.310
- 13) 360.00; 0.210
- 14) 1200.00; 0.090

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-	CROWN TO	STREET-CROSSFALL:		CURB HEIGHT (FT)	GUTTER-GEOMETRIES:			MANNING FACTOR (n)
	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / SIDE/ WAY		WIDTH (FT)	LIP (FT)	HIKE (FT)	
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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.517
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"	-	0.80	0.50	1.000	0	9.95

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.73
TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 0.73

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

O-2

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.433
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.90	0.50	1.000	-

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.95
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.54
AVERAGE FLOW DEPTH(FEET) = 0.38 TRAVEL TIME(MIN.) = 1.29
Tc(MIN.) = 11.25
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 2.43
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 3.11

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.45 FLOW VELOCITY(FEET/SEC.) = 5.04
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

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.259

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

USER-DEFINED - 14.80 0.50 1.000 -

USER-DEFINED - 0.10 0.50 0.900 -

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.23

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.18

AVERAGE FLOW DEPTH(FEET) = 0.73 TRAVEL TIME(MIN.) = 2.81

Tc(MIN.) = 14.05

SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 10.18

EFFECTIVE AREA(ACRES) = 18.60 AREA-AVERAGED Fm(INCH/HR) = 0.50

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 18.6 PEAK FLOW RATE(CFS) = 12.70

0-3

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.86 FLOW VELOCITY(FEET/SEC.) = 5.76

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

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.163

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

USER-DEFINED - 0.10 0.50 1.000 -

USER-DEFINED - 11.70 0.50 1.000 -

USER-DEFINED - 1.10 0.50 0.900 -

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.991

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.58

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.21

AVERAGE FLOW DEPTH(FEET) = 0.94 TRAVEL TIME(MIN.) = 1.97

Tc(MIN.) = 16.02

SUBAREA AREA(ACRES) = 12.90 SUBAREA RUNOFF(CFS) = 7.75

EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.50

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00

0-4

TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 18.85

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.99 FLOW VELOCITY(FEET/SEC.) = 6.43

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 18.0 INCH PIPE IS 12.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 14.21

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 18.85

PIPE TRAVEL TIME(MIN.) = 3.02 Tc(MIN.) = 19.03

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.) = 19.03

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.055

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

USER-DEFINED - 0.10 0.50 1.000 -

USER-DEFINED - 0.30 0.50 1.000 -

USER-DEFINED - 1.40 0.50 1.000 -

USER-DEFINED - 0.60 0.50 1.000 -

USER-DEFINED - 1.00 0.50 1.000 -

USER-DEFINED - 8.30 0.50 1.000 -

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA AREA(ACRES) = 11.70 SUBAREA RUNOFF(CFS) = 5.84

EFFECTIVE AREA(ACRES) = 43.20 AREA-AVERAGED Fm(INCH/HR) = 0.50

AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 43.2 PEAK FLOW RATE(CFS) = 21.62

0-5

FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 19.03

* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.055

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

USER-DEFINED - 5.20 0.50 0.900 -

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900

SUBAREA AREA(ACRES) = 5.20 SUBAREA RUNOFF(CFS) = 2.83

0-5

EFFECTIVE AREA (ACRES) = 48.40 AREA-AVERAGED Fm (INCH/HR) = 0.49
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.99
TOTAL AREA (ACRES) = 48.4 PEAK FLOW RATE (CFS) = 24.45

=====
END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 48.4 TC (MIN.) = 19.03
EFFECTIVE AREA (ACRES) = 48.40 AREA-AVERAGED Fm (INCH/HR) = 0.49
AREA-AVERAGED Fp (INCH/HR) = 0.50 AREA-AVERAGED Ap = 0.987
PEAK FLOW RATE (CFS) = 24.45

=====
END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 20.0 Release Date: 06/01/2013 License ID 1264

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA O ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 10-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3010EV.DAT
TIME/DATE OF STUDY: 16:50 05/23/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 5.00
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 IN- / OUT-/PARK- SIDE / SIDE/ WAY	STREET-CROSSFALL HEIGHT (FT)	CURB GUTTER-GEOMETRIES: MANNING	HEIGHT (FT)	WIDTH (FT)	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	0.020/0.020/ ---	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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.164
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"	B	0.80	0.30	1.000	66	9.95

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.34
TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 1.34

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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.038

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"	B	2.90	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.61
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.27
AVERAGE FLOW DEPTH(FEET) = 0.48 TRAVEL TIME(MIN.) = 1.11
Tc(MIN.) = 11.06
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 4.54
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 5.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.58 FLOW VELOCITY(FEET/SEC.) = 5.84
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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.827
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ SCS SOIL	AREA	Fp	Ap	SCS
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0-3

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LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"      B      14.80    0.30      1.000     66
RESIDENTIAL
".4 DWELLING/ACRE"  B      0.10    0.30      0.900     56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 16.06
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.12
AVERAGE FLOW DEPTH(FEET) = 0.94 TRAVEL TIME(MIN.) = 2.38
Tc(MIN.) = 13.44
SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 20.48
EFFECTIVE AREA(ACRES) = 18.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 18.6 PEAK FLOW RATE(CFS) = 25.57

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.11 FLOW VELOCITY(FEET/SEC.) = 6.90
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 603.00 = 1546.00 FEET.

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FLOW PROCESS FROM NODE 603.00 TO NODE 604.00 IS CODE = 51

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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 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
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.713
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
"OPEN BRUSH"          B     11.70    0.30    1.000    66
RESIDENTIAL
".4 DWELLING/ACRE"    B      1.10    0.30    0.900    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.991
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.79
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.43
AVERAGE FLOW DEPTH(FEET) = 1.23 TRAVEL TIME(MIN.) = 1.64
Tc(MIN.) = 15.08
SUBAREA AREA(ACRES) = 12.90 SUBAREA RUNOFF(CFS) = 16.43
EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 40.08

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0-4

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.32 FLOW VELOCITY(FEET/SEC.) = 7.72
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 604.00 = 2279.00 FEET.

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FLOW PROCESS FROM NODE 604.00 TO NODE 605.00 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) = 455.00 DOWNSTREAM(FEET) = 325.00
FLOW LENGTH(FEET) = 2571.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 17.18
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.08
PIPE TRAVEL TIME(MIN.) = 2.49 Tc(MIN.) = 17.58
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 605.00 = 4850.00 FEET.

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FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
MAINLINE Tc(MIN.) = 17.58
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.571
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"      B      0.10    0.30    1.000    65
NATURAL FAIR COVER
"OPEN BRUSH"          B      0.30    0.30    1.000    66
RESIDENTIAL
".4 DWELLING/ACRE"    B      1.40    0.30    0.900    56
NATURAL FAIR COVER
"WOODLAND,GRASS"      B      0.60    0.30    1.000    65
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B      1.00    0.30    1.000    63
NATURAL FAIR COVER
"OPEN BRUSH"          B      8.30    0.30    1.000    66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.988
SUBAREA AREA(ACRES) = 11.70 SUBAREA RUNOFF(CFS) = 13.43
EFFECTIVE AREA(ACRES) = 43.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
TOTAL AREA(ACRES) = 43.2 PEAK FLOW RATE(CFS) = 49.50

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0-5

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FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
MAINLINE Tc(MIN.) = 17.58
* 5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.571
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"    B      5.20    0.30    0.900    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA(ACRES) = 5.20 SUBAREA RUNOFF(CFS) = 6.09
EFFECTIVE AREA(ACRES) = 48.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98

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0-5

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AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98

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TOTAL AREA (ACRES) = 48.4 PEAK FLOW RATE (CFS) = 55.59

=====
END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 48.4 TC (MIN.) = 17.58
EFFECTIVE AREA (ACRES) = 48.40 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.984
PEAK FLOW RATE (CFS) = 55.59
=====

=====
END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA O ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 25-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3025EV.DAT
TIME/DATE OF STUDY: 16:49 05/23/2018

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
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- / IN- / SIDE	CROSSFALL (FT)	STREET- / OUT- / SIDE	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:

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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.736
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"	B	0.80	0.30	1.000	66	9.95

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.75
TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 1.75

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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.584

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"	B	2.90	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.74
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.60
AVERAGE FLOW DEPTH(FEET) = 0.53 TRAVEL TIME(MIN.) = 1.05
Tc(MIN.) = 11.00
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 5.96
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 7.61

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.64 FLOW VELOCITY(FEET/SEC.) = 6.27
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
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.325
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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0-3

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN

NATURAL FAIR COVER
 "OPEN BRUSH" B 14.80 0.30 1.000 66
 RESIDENTIAL
 ".4 DWELLING/ACRE" B 0.10 0.30 0.900 56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 21.21
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.53
 AVERAGE FLOW DEPTH (FEET) = 1.04 TRAVEL TIME (MIN.) = 2.22
 Tc (MIN.) = 13.22

SUBAREA AREA (ACRES) = 14.90 SUBAREA RUNOFF (CFS) = 27.16
 EFFECTIVE AREA (ACRES) = 18.60 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 18.6 PEAK FLOW RATE (CFS) = 33.90

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 1.24 FLOW VELOCITY (FEET/SEC.) = 7.36
 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

0-4

MANNING'S FACTOR = 0.040 MAXIMUM DEPTH (FEET) = 30.00
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.184

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	11.70	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.10	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.991
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 44.85
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 7.98
 AVERAGE FLOW DEPTH (FEET) = 1.37 TRAVEL TIME (MIN.) = 1.53
 Tc (MIN.) = 14.76

SUBAREA AREA (ACRES) = 12.90 SUBAREA RUNOFF (CFS) = 21.90
 EFFECTIVE AREA (ACRES) = 31.50 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA (ACRES) = 31.5 PEAK FLOW RATE (CFS) = 53.43

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH (FEET) = 1.46 FLOW VELOCITY (FEET/SEC.) = 8.33
 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 27.0 INCH PIPE IS 18.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 18.50
 ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 53.43
 PIPE TRAVEL TIME (MIN.) = 2.32 Tc (MIN.) = 17.07
 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.) = 17.07
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.009

0-5

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					
"WOODLAND, GRASS"	B	0.10	0.30	1.000	65
NATURAL FAIR COVER					
"OPEN BRUSH"	B	0.30	0.30	1.000	66
RESIDENTIAL					
".4 DWELLING/ACRE"	B	1.40	0.30	0.900	56
NATURAL FAIR COVER					
"WOODLAND, GRASS"	B	0.60	0.30	1.000	65
NATURAL FAIR COVER					
"CHAPARRAL, BROADLEAF"	B	1.00	0.30	1.000	63
NATURAL FAIR COVER					
"OPEN BRUSH"	B	8.30	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.988
 SUBAREA AREA (ACRES) = 11.70 SUBAREA RUNOFF (CFS) = 18.03
 EFFECTIVE AREA (ACRES) = 43.20 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
 TOTAL AREA (ACRES) = 43.2 PEAK FLOW RATE (CFS) = 66.50

 FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc (MIN.) = 17.07
 * 10 YEAR RAINFALL INTENSITY (INCH/HR) = 2.009

0-5

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"	B	5.20	0.30	0.900	56

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
 SUBAREA AREA (ACRES) = 5.20 SUBAREA RUNOFF (CFS) = 8.14
 EFFECTIVE AREA (ACRES) = 48.40 AREA-AVERAGED Fm (INCH/HR) = 0.30
 AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98

TOTAL AREA (ACRES) = 48.4 PEAK FLOW RATE (CFS) = 74.64

=====
END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 48.4 TC (MIN.) = 17.07
EFFECTIVE AREA (ACRES) = 48.40 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.984
PEAK FLOW RATE (CFS) = 74.64
=====

=====
END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 20.0 Release Date: 06/01/2013 License ID 1264

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA O ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 50-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3050EV.DAT
TIME/DATE OF STUDY: 16:49 05/23/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 15.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
USER-DEFINED TABLED RAINFALL USED
NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14

- 1) 5.00; 4.440
- 2) 10.00; 3.010
- 3) 15.00; 2.390
- 4) 20.00; 2.030
- 5) 25.00; 1.790
- 6) 30.00; 1.600
- 7) 40.00; 1.370
- 8) 50.00; 1.200
- 9) 60.00; 1.060
- 10) 90.00; 0.860
- 11) 120.00; 0.730
- 12) 180.00; 0.590
- 13) 360.00; 0.410
- 14) 1200.00; 0.170

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) (FT)	MANNING HIKE 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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.024

O-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 "OPEN BRUSH"	B	0.80	0.30	1.000	66	9.95

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.96
TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 1.96

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
* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.891

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"	B	2.90	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.34
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.80
AVERAGE FLOW DEPTH(FEET) = 0.55 TRAVEL TIME(MIN.) = 1.01
Tc(MIN.) = 10.96
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 6.76
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 8.63

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.67 FLOW VELOCITY(FEET/SEC.) = 6.47

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
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.624

0-3

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" B 14.80 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 0.10 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.25
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.76
AVERAGE FLOW DEPTH(FEET) = 1.09 TRAVEL TIME(MIN.) = 2.15
Tc(MIN.) = 13.11
SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 31.17
EFFECTIVE AREA(ACRES) = 18.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 18.6 PEAK FLOW RATE(CFS) = 38.90

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.30 FLOW VELOCITY(FEET/SEC.) = 7.65
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
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.441

0-4

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
"OPEN BRUSH" B 11.70 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 1.10 0.30 0.900 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.991
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 51.35

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.26
AVERAGE FLOW DEPTH(FEET) = 1.44 TRAVEL TIME(MIN.) = 1.48
Tc(MIN.) = 14.59
SUBAREA AREA(ACRES) = 12.90 SUBAREA RUNOFF(CFS) = 24.88
EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 60.72

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.54 FLOW VELOCITY(FEET/SEC.) = 8.57
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 27.0 INCH PIPE IS 20.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.85
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 60.72
PIPE TRAVEL TIME(MIN.) = 2.27 Tc(MIN.) = 16.87
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.) = 16.87
* 15 YEAR RAINFALL INTENSITY (INCH/HR) = 2.256
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" B 0.10 0.30 1.000 65
NATURAL FAIR COVER
"OPEN BRUSH" B 0.30 0.30 1.000 66
RESIDENTIAL
".4 DWELLING/ACRE" B 1.40 0.30 0.900 56
NATURAL FAIR COVER
"WOODLAND,GRASS" B 0.60 0.30 1.000 65
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B 1.00 0.30 1.000 63
NATURAL FAIR COVER
"OPEN BRUSH" B 8.30 0.30 1.000 66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.988
SUBAREA AREA(ACRES) = 11.70 SUBAREA RUNOFF(CFS) = 20.63
EFFECTIVE AREA(ACRES) = 43.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
TOTAL AREA(ACRES) = 43.2 PEAK FLOW RATE(CFS) = 76.11

0-5

FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

MAINLINE Tc(MIN.) = 16.87

* 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.256

0-5

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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RESIDENTIAL

".4 DWELLING/ACRE"	B	5.20	0.30	0.900	56
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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900

SUBAREA AREA(ACRES) = 5.20 SUBAREA RUNOFF(CFS) = 9.29

EFFECTIVE AREA(ACRES) = 48.40 AREA-AVERAGED Fm(INCH/HR) = 0.30

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98

TOTAL AREA(ACRES) = 48.4 PEAK FLOW RATE(CFS) = 85.40
=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 48.4 TC(MIN.) = 16.87

EFFECTIVE AREA(ACRES) = 48.40 AREA-AVERAGED Fm(INCH/HR)= 0.30

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.984

PEAK FLOW RATE(CFS) = 85.40
=====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* RMV PA-3 SUBAREA O ROMP 2018 *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL *
* 100-YR EV MAY 2018 ROKAMOTO *

FILE NAME: PA3000EV.DAT
TIME/DATE OF STUDY: 12:58 05/23/2018

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*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 IN- / OUT-/PARK- SIDE / SIDE/ WAY	STREET-CROSSFALL: HEIGHT (FT)	CURB GUTTER-GEOMETRIES: (FT)	STREET-CROSSFALL: LIP (FT)	STREET-CROSSFALL: 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:

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"	B	0.80	0.30	1.000	66	9.95

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 2.14
TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 2.14

0-1

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) = 3.094

0-2

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"	B	2.90	0.30	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.79
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.83
AVERAGE FLOW DEPTH(FEET) = 0.58 TRAVEL TIME(MIN.) = 1.01
Tc(MIN.) = 10.96
SUBAREA AREA(ACRES) = 2.90 SUBAREA RUNOFF(CFS) = 7.29
EFFECTIVE AREA(ACRES) = 3.70 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 3.7 PEAK FLOW RATE(CFS) = 9.30

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.68 FLOW VELOCITY(FEET/SEC.) = 6.63
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) = 2.800
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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0-3

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LAND USE      GROUP  (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"      B      14.80    0.30      1.000     66
RESIDENTIAL
".4 DWELLING/ACRE"  B      0.10    0.30      0.900     56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.10
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.88
AVERAGE FLOW DEPTH(FEET) = 1.12 TRAVEL TIME(MIN.) = 2.11
Tc(MIN.) = 13.07
SUBAREA AREA(ACRES) = 14.90 SUBAREA RUNOFF(CFS) = 33.53
EFFECTIVE AREA(ACRES) = 18.60 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 18.6 PEAK FLOW RATE(CFS) = 41.86

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.34 FLOW VELOCITY(FEET/SEC.) = 7.77
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 603.00 = 1546.00 FEET.

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*****
FLOW PROCESS FROM NODE 603.00 TO NODE 604.00 IS CODE = 51

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>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

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ELEVATION DATA: UPSTREAM(FEET) = 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

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0-4

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* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.638
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
"OPEN BRUSH"          B     11.70    0.30    1.000   66
RESIDENTIAL
".4 DWELLING/ACRE"    B      1.10    0.30    0.900   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.991
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 55.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.40
AVERAGE FLOW DEPTH(FEET) = 1.48 TRAVEL TIME(MIN.) = 1.45
Tc(MIN.) = 14.52
SUBAREA AREA(ACRES) = 12.90 SUBAREA RUNOFF(CFS) = 27.17
EFFECTIVE AREA(ACRES) = 31.50 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 31.5 PEAK FLOW RATE(CFS) = 66.31

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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.58 FLOW VELOCITY(FEET/SEC.) = 8.81
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 604.00 = 2279.00 FEET.

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*****
FLOW PROCESS FROM NODE 604.00 TO NODE 605.00 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) = 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 19.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.60
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 66.31
PIPE TRAVEL TIME(MIN.) = 2.19 Tc(MIN.) = 16.71
LONGEST FLOWPATH FROM NODE 600.00 TO NODE 605.00 = 4850.00 FEET.

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*****
FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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MAINLINE Tc(MIN.) = 16.71
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437
SUBAREA LOSS RATE DATA(AMC II):

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0-5

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DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp     Ap   SCS
LAND USE           GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL FAIR COVER
"WOODLAND,GRASS"      B      0.10    0.30    1.000   65
NATURAL FAIR COVER
"OPEN BRUSH"          B      0.30    0.30    1.000   66
RESIDENTIAL
".4 DWELLING/ACRE"    B      1.40    0.30    0.900   56
NATURAL FAIR COVER
"WOODLAND,GRASS"      B      0.60    0.30    1.000   65
NATURAL FAIR COVER
"CHAPARRAL,BROADLEAF" B      1.00    0.30    1.000   63
NATURAL FAIR COVER
"OPEN BRUSH"          B      8.30    0.30    1.000   66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.988
SUBAREA AREA(ACRES) = 11.70 SUBAREA RUNOFF(CFS) = 22.54
EFFECTIVE AREA(ACRES) = 43.20 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.99
TOTAL AREA(ACRES) = 43.2 PEAK FLOW RATE(CFS) = 83.15

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*****
FLOW PROCESS FROM NODE 605.00 TO NODE 605.00 IS CODE = 81

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```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

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```

MAINLINE Tc(MIN.) = 16.71
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437
SUBAREA LOSS RATE DATA(AMC II):

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0-5

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DEVELOPMENT TYPE/   SCS SOIL  AREA   Fp     Ap   SCS
LAND USE           GROUP  (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
".4 DWELLING/ACRE"    B      5.20    0.30    0.900   56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA AREA(ACRES) = 5.20 SUBAREA RUNOFF(CFS) = 10.14
EFFECTIVE AREA(ACRES) = 48.40 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98

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TOTAL AREA (ACRES) = 48.4 PEAK FLOW RATE (CFS) = 93.29

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END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 48.4 TC (MIN.) = 16.71
EFFECTIVE AREA (ACRES) = 48.40 AREA-AVERAGED Fm (INCH/HR) = 0.30
AREA-AVERAGED Fp (INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.984
PEAK FLOW RATE (CFS) = 93.29
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END OF RATIONAL METHOD ANALYSIS